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JOURNAL
OF THE
ASIATIC SOCIETY.

OCTOBER. 1849.

CATALOGUE OF MALAYAN FISHES.

BY

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The following Catalogue of Fishes is the result of observations made during an official residence of three years and a half in Prince of Wales Island (Pulo Pinang), and during visits to Province Wellesley, Malacca, the Lankavy Islands* and Singapore. The fishermen supplying the markets of Pinang and Singapore are principally natives of China, of whom numbers in search of work annually arrive in Chinese junks. In the course of time four or five commonly join and lay out their savings in boat materials, nets and fishing stakes. The fishing boats vary from one to three tons burden; they are of a slight make and calculated to ply at but short distances from the shore. They are pulled by oars, and seldom carry sails. The nets are made of twine, tanned with bark of Mangrove. The bamboo fishing-stakes are clumsy contrivances. That they answer well enough in fine weather is more owing to the riches of the sea and their sheltered position, than to the ingenuity of the contrivance or the durability of the materials. In nautical skill the Chinese fishermen of the Straits Settlements are far behind the Malays. Although originally a sturdy race, their morals and frames suffer from the consequences of opium-smoking, gambling and the concomitant

* A group of Islands on the West Coast of the Malayan Peninsula. (6° N. L.)

vices. Their trade exposes these men to little exertion or hardship, and the greater part of their time is spent idly, if not viciously, on shore. Contrary to their countrymen in general, the Chinese fish-ermeu are considered the least desirable class of settlers. The fish-mongers are also natives of China, but they form a class far superior to the fishermen. Their trade comprises the following branches, viz.

1. Fresh Fish.
2. Dried Fish.
3. Isinglass (Fish-Maws).
4. Fish-Roes.
- 5, 6. Red Fish and "Sardines."
7. Sharks' Fins.
8. Baláchian.
9. Fish Manure.
10. Tripang.

1. FRESH FISH. The fishermen dispose of their boat loads to the fishmongers who assort the different kinds in heaps, over which seawater is continually poured, and from these the daily customers are supplied. Although comparatively few kinds of fishes appear on the tables of Europeans, the Malays and Chinese are less nice in their selection, and reject but very few kinds.

2. DRIED FISH. The daily surplus of fishes is cured by the fishmongers. The process commences with a partial abrasion of the scales, after which the larger fishes are opened lengthwise, and the intestines removed. Water is repeatedly poured over the fishes till blood and impurities have disappeared, when they are placed in casks in flat layers, between which is thrown a quantity of salt. In this state the fishes remain from 24 to 48 hours, when they are exposed to the sun, and frequently turned, till they are thoroughly dried. The smaller kinds are not opened, nor are they all salted before drying in the sun. The little care bestowed upon the curing appears, however, to be sufficient for local consumption, and none of our Settlements in the Straits export dried fishes. The Pikul* sells from 3 to 7 Spanish Dollars.†

* The Pikul of 100 Katties equals $133\frac{1}{4}$ lbs; the Katty $1\frac{1}{3}$ lb.

† The Spanish Dollar is about 4s. 6d.

3. ISINGLASS, FISH-MAWS, (*Palongpong ikan* or *ari ari ikan* of the Malays, *loo-pa* of the Chinese) appear to have formed an article of exportation from the islands of the Indian Archipelago as early as they became visited by the Chinese. When these people commenced to settle in the Straits, they not only there collected fish-maws, but also from distant localities. Bombay, Ceylon, Madras, Bengal, Tenasserim, and most of the Malayan Islands contribute to the annual supply, which is bought up by Chinese dealers at Pinang, Malacca and Singapore. By them the maws are exported to China. The fact was noted by Mr. Crawford, but that the fish-maws are isinglass, appears to be the discovery of an anonymous correspondent in Parbury's *Oriental Herald* for January 1839. The personal exertions of Mr. McClelland have been mainly instrumental in adding isinglass to the articles of exportation from India to the European markets.

Since 1842, Mr. W. T. Lewis, Asst. Resid. Counsellor of Pinang, has made some very successful attempts to improve the production of isinglass in Prince of Wales Island. But European merchants there appear unwilling to engage in this novel branch of commerce, as the supply from want of proper care is uncertain, and procurable but in comparatively small quantities. These, however, are no objections to the Chinese dealers, as they are sure of a profitable and quick return of their outlay. The fishes from which isinglass is obtained at Pinang are :

Lates heptadactylus, (*Ikan siyaknp*.) page 983.

Polynemus indicus, (*Ikan kúrow*.) p. 1011.

Otolithus biauritus, (*Ikan salámpai*.) p. 1039.

Otolithus ruber, (*Jarang gígi*.) p. 1041.

Otolithus argenteus, (*Jarang gígi*.) p. 1043.

Otolithus maculatus, (*Jarang gígi*.) p. 1044.

Johnius diacanthus, (*Ikan tambaréh*.) p. 1049.

Lobotes erate, (*Ikan batu*.) p. 1062.

Arius truncatus, (*Ikan salúdu*.) p. 1238.

Arius arius, (*Ikan salúdu*.) p. 1240.

Arius militaris, (*Ikan salúdu*.) p. 1241.

The annexed Table, exhibiting the quantity of isinglass imported into and exported during 10 years from Pinang to China, has been communicated by Mr. W. T. Lewis.

QUANTITIES AND VALUE OF FISH-MAWS IMPORTED INTO AND EXPORTED FROM PRINCE OF WALES ISLAND, FROM 1832 TO 1842.

IMPORT.			EXPORT.		
	Quantity in Pikuls.	Value in Dollars.		Quantity in Pikuls.	Value in Dollars.
1832-33	163	6,113	1832-33	182	8,190
1833-34	103	4,795	1833-34	170	7,036
1834-35	126	4,671	1834-35	224	7,835
1835-36	76	2,970	1835-36	172	1,610
1836-37	135	4,775	1836-37	184	7,035
1837-38	120	4,055	1837-38	202	7,875
1838-39	103	5,118	1838-39	204	9,140
1839-40	71	3,034	1839-40	192	7,299
1840-41	309	10,227	1840-41	144	5,299
1841-42	117	4,414	1841-42	265	12,523
TOTAL.	1,323	50,172	TOTAL.	1,939	73,842

4. FISH-ROES, 5. RED FISH and 6. "SARDINES." An account of these condiments will be found under the species used in the preparation, viz.

4. *Alausa toli*, (*Ikan truboh*), page 1281.

5. *Engraulis brownii*, (*Bunga ayer* or *badah*), page 1285.

6. { *Dussumieria acuta*, (*Tamban-búlat*), page 1268.
Clupeonia perforata, (*Tamban-népis* or *batul*), page 1276.

7. SHARKS' FINS. The Chinese fishmongers of the Straits Settlements obtain Sharks' fins from the same localities which supply them with Fish-maws. These fins are not exclusively selected from Sharks

(*Squali*), but equally from Rays (*Rajae*). Quantities examined at Pinang were composed of fins of the following Genera: *Stegostoma*, *Carcharias*, *Sphyrna*, *Pristis*, *Rhinobatus*, *Trygon* and *Myliobatis*. Of all fishes Sharks and Rays are the most valuable to the Chinese. The flesh and entrails of all, not even the electric Rays (*Torpedinidæ*) excepted, are eaten either fresh or dried; the skin is used for polishing or converted into shagreen; gelatina is obtained from the larger fins, glue from the smaller. All, except the caudal fins, are cut at the root so as to leave as little flesh as possible. The root is dipped in wetted lime (Chunam) in the erroneous belief of preventing attacks of insects, and then the fins are dried in the sun. Those imported in the Straits Settlements are packed promiscuously in gunny bags, each containing from one half to one Pikul. According to the value in the Chinese market, the fishmongers assort the fins in two kinds: "white" and "black." The white consist exclusively of the dorsal fins, which are on both sides of a uniform light colour, and reputed to yield more gelatina than the other fins. In China the lovers of gelatinous soups pay from 30 to 40 Spanish Dollars per Pikul of white fins. The pectoral, ventral and anal fins pass under the denomination of black fins. The colour, however, varies according to the species from buff to grey or brown, and most of them are of two different colours, the upper surface being dark, the lower light. The black fins, for obvious reasons the most numerous, are supposed to yield a comparatively small quantity of gelatina, and sell in China from 15 to 20 Spanish Dollars per Pikul. Mr. W. T. Lewis has communicated the annexed Table, shewing the quantity of Sharks' fins imported into and exported during 10 years from Pinang to China.

QUANTITIES OF SHARKS' FINS IMPORTED INTO AND EXPORTED
FROM PRINCE OF WALES ISLAND, FROM 1832 TO 1842.

IMPORT.			EXPORT.		
	Quantity in Pikuls.	Value in Sp. Dollars.		Quantity in Pikuls.	Value in Sp. Dollars.
1832-33			1832-33	40	500
1833-34	91	977	1833-34	308	4,927
1834-35	79	893	1834-35	408	4,770
1835-36	27	350	1835-36	267	3,817
1836-37	129	1,287	1836-37	329	5,699
1837-38	60	966	1837-38	195	4,432
1838-39	195	3,001	1838-39	426	5,451
1839-40	76	1,703	1839-40	319	5,970
1840-41	172	2,582	1840-41	360	4,689
1841-42	521	7,457	1841-42	525	7,781
TOTAL,	1,350	19,216	TOTAL,	3,177	48,036

8. BALÁCHAN, is a condiment prepared from small fishes of all descriptions and shell-fish. The ingredients are placed in a pit to undergo fermentation, and afterwards dried, pounded, and preserved with spices. With the Malays, Siamese, Burmese and Cochin-Chinese, Baláchan has become a necessary of life, as it serves to season the daily food of these nations.

9. FISH-MANURE. The smallest fishes, and all offal are employed in the spice plantations by the Chinese gardeners and agriculturists of Pinang, who consider the fluid in which fishes have been salted a very useful manure in cocoanut plantations.

10. In addition to the preceding, there are two animal productions of the eastern seas, which also are considered fishes by the Chinese. They are the dried *Holothurioidæ*, called *Tripang swala* or *Beche de*

mar, and *Cuttle Fishes*. Of both large quantities are annually collected and dried for the market in China.

The naked Cephalopods are not only eaten fresh, but one species, a *Loligo*, forms in its dried state a considerable article of traffic. The preparation consists in removing the inkbag without laying open the mantle. After all impurities have been removed by water, the mollusc is submitted to a slight pressure, and ultimately exposed to the sun. Small bundles of one Katty's weight are tied up with slips of ratan, and enclosed in cases holding 10 Katties and upwards. The Pikul sells at the rate of 14 to 16 Spanish Dollars.

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\* In the following Catalogue have been admitted the names of such of the *Illustrations* only of which descriptions have been published. Genera and species founded on these figures alone have in several instances originated errors.

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BUCHANAN HAMILTON'S ICHTHYOLOGICAL DRAWINGS.

They consist of 144 coloured figures of fishes executed by native painters, and they form a portion of the series of Zoological Drawings* which on Buchanan Hamilton's departure from India were deposited in the Library of the Honorable Company's Botanic Gardens, Calcutta. In the valuable Report on the Calcutta Botanic Garden Mr. Griffith has given the following account of these Drawings: "Coloured Drawings of Dr. Buchanan, (afterwards Hamilton,) stated to have been deposited in the Library in 1815.

Fishes,	144
Reptiles,	19
Birds,	349
Quadrupeds,	36

For many of the originals copies appear to have been substituted. There are in addition 18 folio sheets containing copies of some of the drawings of Fish, executed apparently in Dr. Wallich's time. Of Birds, &c. there are also similar duplicate copies 22; and of unfinished and un-named 14." (*William Griffith: Report on the Hon'ble Company's Botanic Gardens. Printed by Authority. Calcutta, 1843. Part V. Library Department, page 96.*)

* In the preface to the fourth volume of *Histoire Naturelle des Poissons*, (Paris, 1829,) the authors acknowledge their having, through Dr. Horsfield, had access to a series of Buchanan Hamilton's Ichthyological Drawings in the Library of the East India House, London.

Mr. Griffith while superintending the Botanic Gardens transferred these drawings to the Library of the Asiatic Society, Bengal. To nearly every Drawing of the Fishes Buchanan Hamilton has in his own hand-writing attached a systematic or vernacular name under which most of the species were subsequently published in his Work upon the Fishes of the Ganges. This is the series of Buchanan Hamilton's Zoological Drawings, which Mr. McClelland complains of having been kept closed from public view in the Botanic Gardens, Calcutta, from 1815 to 1838, during twenty-two years subsequent to Buchanan's departure from India. Years have elapsed, and no explanation has been offered to Mr. McClelland's just observations: "Had such an injury to the advancement of information resulted from an oversight in an ordinary public office, the circumstance would excite less surprise; but that the works of naturalists should be so treated in a public Institution expressly intended for the promotion of science, is so unaccountable to me, that I cannot presume to express an opinion on the subject. But as the case stands, perhaps the best remedy that can now be applied in justice to Buchanan, as well as to others who are still engaged in scientific pursuits, would be to give a complete edition of his labours, botanical and zoological, to the public; at the same time it is right to say that no atonement can now make amends for the injury that has been inflicted on Buchanan as a naturalist, or for the time that has been lost in allowing others to go over unnecessarily the ground which he investigated, instead of beginning where he left off." (*Asiatic Researches, Vol. XIX. Second Part, page 223. Calcutta, 1839.*)

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[Localities printed in *Italics* signify those from whence the fishes were obtained ; in ordinary type those previously given by authors. The descriptions are drawn up from recently taken specimens.]

SUBCLASSIS—TELEOSTEI.

ORDO.—ACANTHOPTERI.

FAM. PERCOIDÆ.

GEN. LATES, *Cuvier and Valenciennes*, 1828.

Infraorbital- and humeral bones, and preopercle strongly toothed, the latter with a spine at the angle ; anterior dorsal fin higher but shorter than in *Perca* and *Labrax* ; tongue smooth.

LATES HEPTADACTYLUS, (Lacépède.)

Perca maxima, Sonnerat (MS.?) Cuv. and Val. II. 96.

Holocentre heptadactyle, Lacépède, IV. 344 and 391.

Russell, CXXXI. Pandoomenoo.

Coius vacti, Buchanan Ham. 86, 369, Pl. 16, Fig. 28.

Lates nobilis, Cuv. and Val. II. 96, Pl. 13.

Lates nobilis, Cuv. R. A. II. 134⁽¹⁾.

Lates nobilis, Richardson : Report, 1845, 222.

Lates nobilis, Bleeker : Verh. Batav. Genoots. XXII. 16, 27.

Ikan Siyakup of the Malays.

Head and back brownish, or blackish pale green, sides silvery grey ; scales with a brownish spot at the root, or edged with that colour ;

abdomen silvery ; pectorals and ventrals pale yellow, the other fins brownish or blackish. Iris blackish golden ; pupil cornelian red.

*D 7 or 8—1/11 or 12, C 18 or 17 $\frac{3}{4}$, A 3/8 or 9, V 1/5, P. 17 or 18
Br. VII.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singapore.*

Bay of Bengal, estuaries of the Ganges, Indian Ocean, China Sea, Canton, Java, Madura.

TOTAL LENGTH, 5 feet.

Those inhabiting brackish water are of a muddy flavour, and blackish or of much darker colours than those living in the sea. The species appears to be less numerous in the Straits of Malacca than in Bengal. Both in fresh and in dried state, it is highly valued as an article of food. It also yields isinglass, of which however, in the Straits, but little is collected, partly on account of the comparative scarcity of the fish, and partly owing to the thinness of the air-vessel. That of a large-sized fish when dried, weighs upwards of one ounce. At Pinang this kind sells at the rate of 25 to 30 Spanish Dollars pr. Pikul.

GEN. APOGON, *Lacépède*, 1802.

Scales large, deciduous ; the two short dorsals widely separated ; margin of the preopercle double, finely toothed ; pyloric appendages few.

APOGON PÆCILOPTERUS, Kuhl. and Van Hasselt?

? Apogon pæcilopterus, Cuv. and Val. II. 154

Head above, back and upper half of the sides reddish brown ; lower half and abdomen mother of pearl ; crown and sides of the head minutely dotted with black ; opercles silvery ; on the tail, in the middle of the base of the caudal, a large rounded blackish spot ; membrane between first, second and third spines black ; rest hyaline, minutely dotted with brown ; posterior dorsal, caudal and anal, pale yellowish, dotted with pale brown, ventrals pale yellowish ; pectorals hyaline. Iris mother of pearl, upper half black.

D 6—1/9, C 15 $\frac{6}{7}$, A 2/3, V 1/5, P 13, Br. VII.

* Russell : D 7—1/13, C 18, A 3/9, V 1/5, P 15.

Buchan : D 7—1/12, C 18, A 3/11, V 1/5, P 17.

Cuv. and Val : D 7 or 8—1/12, A 3/8 or 9.

HABIT.—*Sea of Pinang, Singapore.*

TOTAL LENGTH, $4\frac{7}{8}$ inch.

The length of the head is $\frac{1}{3}$ of the total; the orbit borders on the profile, and occupies the second fourth of the head; the distance between the orbits across the forehead is $\frac{2}{4}$ of the horizontal diameter of the orbit, which is $\frac{1}{4}$ of the length of the head. The posterior margin of the preopercle is finely serrated nearly all round, except a small portion of the lower part; the opercle terminates in a broad triangular membranous point, in the upper margin of which appears a deep rounded incision. The vertical diameter at occiput is $\frac{2}{3}$, in front of the anterior dorsal a little less than the length of the head, at the root of the caudal it slightly exceeds $\frac{1}{3}$ of the head. The sides are covered by 11 longitudinal series of rounded, finely ciliated scales, each with 15 to 18 radiating lines at the base. The lateral line follows the outline of the back; it occupies the third upper series of scales, 23 or 24, on each of which appears a central, longitudinal tube, with one or two minute tubes on each side of its root. The scales of the series immediately above and below the lateral line present an indistinct longitudinal elevation. The first dorsal spine is $\frac{1}{4}$ of the second and third, the longest and strongest, each of which is $2\frac{1}{2}$ of the length of the head; the sixth spine exceeds the first by one third; the spine of the posterior dorsal, the second anal and the ventrals are of equal length, $\frac{1}{3}$ of that of the head. In the inconstant character of colours, the present species differs from *A. pæcilopterus*, but both agree in their number of fin rays, and general resemblance to the Mediterranean species. (*A. rex mullorum*, Cuv. and Val. II. 143.) It is to be regretted that the description of *A. pæcilopterus* is not sufficiently explicit for identification. At Pinang and Singapore single individuals of the present species are of uncertain occurrence.

APOGON QUADRIFASCIATUS, Cuv. and Val.

? *Mullus fasciatus*, White; Voyage, 268, Fig. 1

Apogon quadrifasciatus, Cuv. and Val. II. 153.

Apogon quadrifasciatus, Bleeker: Verh. Batav. Gen. XXII. 16, 28.

Crown of the head and back brownish black; sides and abdomen, mother of pearl; a broad black band from above the orbit to the root of the caudal; a second parallel from behind the orbit, first beneath the lateral line, but from near the posterior part of the second dorsal

it intersects the lateral line, continuing above it through the middle of the caudal fin; upper half of anterior dorsal, between 3d and 6th spine, more or less intense black; the other fins pale yellowish, or pale crimson; all except the pectorals with broad blackish margins. Iris silvery with large black spots.

D 7—1/9, C 17 $\frac{5}{8}$, A 2/8, V 1/5, P 16, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Pondicherry, Batavia.

TOTAL LENGTH, 4 $\frac{1}{8}$ inch.

In the young the two lateral black bands, and the blackish margins of the fins are very indistinct, or scarcely perceptible. All the species of the fins exhibit traces of transversal striæ. This species is not numerous at Pinang.

APOGON FUCATUS, Cantor.

Body and fins, except the pectorals, silvery carmine with rainbow reflections, cheeks, throat and abdomen paler; from the lower part of the orbit to the muzzle a gamboge oblique line; at the root of the caudal a large round black spot, surrounded by numerous minute brown dots, and a few similar on the scales of the posterior part of abdomen. Pupil circular, black with crimson reflection; iris golden gamboge, the upper fourth part ultramarine.

D 6—1/9, C 18 $\frac{1}{4}$, A 2/16, V 1/5, P 13, Br. VII.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH, 2 $\frac{6}{8}$ inch.

The length of the head is contained about 3 $\frac{1}{2}$ times in the total; its depth, which is little less than that of the body, equals its length; the eye is large, circular, the diameter slightly exceeding $\frac{1}{3}$ of the length of the head; the mouth small, little protractile; gape subvertical; the angle of the mouth a little in front of the anterior margin of the orbit; teeth excessively minute; margin of preopercle very finely toothed; lateral line following the outline of the back, nearly throughout oblique, becoming horizontal close to the root of the caudal. Examined under a lens, the spines of all the fins are transversely striated, as in the Genus *Chanda*. The spines of the anterior dorsal are very slender, as in *A. macropterus*, Kuhl and Van Hasselt, and scarcely arched. The lower part of the anterior margin of the second spine is armed with three blunt teeth, vertically situated. The second, third and fourth spine,

are of nearly equal length : about one half of the vertical diameter of the body. The spine of the posterior dorsal fin equals in length the longest anterior, but the second branched ray, which slightly exceeds the first and third, is $\frac{2}{3}$ of the vertical diameter of the body. The distance between the last, double, ray of the posterior dorsal, and the root of the caudal equals the length of the head. The caudal is slightly forked : the length of the centre $\frac{1}{6}$ of the total. The basal extent of the anal is a little less than the length of the head ; the second and third branched ray are the longest, equalling the corresponding rays of the posterior dorsal fin. The distance between the sixteenth double anal ray, and the root of the caudal is but about one half of that between the latter and the last ray of the posterior dorsal, or about $\frac{1}{2}$ of the length of the head. The first branched ray of the ventrals equals in length the second spine of the anterior dorsal. The length of the transparent pectorals is about $\frac{2}{3}$ of the vertical diameter of the body.

This species is closely allied to *Apogon lineolatus*, Ehrenberg, the peculiar colouration is strikingly similar in both, but it differs from the latter, and the other species, in the greater number of anal rays, and in the toothed appearance of the second dorsal spine. A single specimen was observed at Pinang in July 1845. The fishermen asserted it to be of very rare occurrence. The very capacious stomach, occupying the whole length of the abdominal cavity, was expanded with minute shrimps ; the intestinal canal is less than one third of the total length, and without cœcopyloric appendages. The rounded acoustic bones are, for the size of the fish, remarkably large.

GEN. CHANDA,* *Buchan. Ham.* 1822.

(*Ambassis*, † *Cuv. and Val.* 1828.—*Hamiltonia*, ‡ *Swainson*, 1839.)

* Not from *χανδός*, hians, as stated by mistake in *Nomenclator Zoologicus*, (Pisces, p. 15,) but from *Chanda*, the vernacular name, applied in Bengal to the Genus. (*Chandee*, Hind. Silver.)

† MM. Cuvier and Valenciennes observe that the two first species of *Chanda*, described by Buchanan, belong to a different genus, and they have for that reason cancelled *Chanda*. Buchanan himself expressed doubts as to the propriety of placing his first species in that genus.

‡ Fam. *Zenidæ* (*Scombroidæ*, Bonap.) Swainson, *Fishes, &c.* Vol. II. p. 250. "*Hamiltonia ovata*, Sw., *Ham.* fig. 37, and *H. lata*, Sw., *Ham.* fig. 37." Both references are errata.

Teeth sharp, scattered in both jaws, with some of the bones of the head distinctly indented on the edge ; with prickles in some of the fins, and with bodies more or less diaphanous, and much compressed ; the sides nearly perpendicular.

CHANDA DUSSUMIERI, (Cuv. and Val.)

Ambassis dussumieri, Cuv. and Val. II. 181.

Ambassis dussumieri, Bleeker : Verh. Bat. Gen. XXII. 17, 30.

Crown of the head and the back pale greenish, minutely dotted with black, opercle bluish silvery ; sides pale silvery with a narrow longitudinal shining silvery band from the opercle to the caudal fin ; abdomen transparent with the silvery peritoneum shining through. Fin-membranes transparent ; that connecting the 2d and 3d dorsal spine, minutely dotted with black and with a black margin ; caudal in some with a blackish margin. Iris silvery ; the upper fourth part black.

D 7—1/9, C $17\frac{5}{8}$, A 3/9, V 1/5, P 17, Br. VI.

HABIT.—*Sea of Pinang.*

Malabar, Java, Madura.

TOTAL LENGTH : 3 inch.

The vertical diameter of the body is contained about $3\frac{1}{2}$ times in the total length. This species appears to occur but rarely at Pinang. In three examined there was no external appearance of the horizontal spine in front of the first dorsal.

CHANDA NALUA, Buchan. Ham.

Chanda nalua, Buch. Ham. 107, Pl. 6, Fig. 36.

Ambassis nalua, Cuv. and Val. II. 182.

Ambassis nalua, Bleeker : Verh. Bat. Gen. XXII. 17, 29.

Crown of the head and back pale greenish, with a few indistinct blackish spots at the base of the dorsal fins ; sides pale silvery, with a narrow longitudinal shining silvery band from the opercle to the caudal fin ; cheeks and opercles iridescent silvery, the latter with a blackish spot between the angle and the orbit, produced by numerous blackish dots ; abdomen transparent, iridescent, with the silvery peritoneum shining through ; fins pale citrine, the membrane of the anterior dorsal minutely dotted with black, particularly between the 2d and 3d spine, with a black margin. Iris silvery with a black spot beneath the upper margin of the orbit ; pupil circular, black with crimson reflection.

D 7—1/9, 10 or 11, C $17\frac{1}{2}$, A 3/9 or 10, V 1/5, P 15, Br. VI.

HABIT.—*Sea of Pinang.*

Rivers of Lower Bengal, Batavia, Samarang, Surubaya, Bima, Sumbawa.

TOTAL LENGTH : $4\frac{1}{2}$ inch.

As observed by MM. Cuvier and Valenciennes this species differs from *Chanda gymnocephala* (Lacépède). (Syn. *Sciæna safgha* Forskal?—*Lutjanus gymnocephalus*, Lacép.—*Centropomus ambassis*, Lacép.—*Ambassis commersonii*, Cuv. and Val. II. 17, Pl. 25) by its comparatively shorter head, blunter muzzle, and greater depth of the body. Besides, it may at once be distinguished by the extent of the membrane connecting the anterior to the posterior dorsal, which in the present species attaches itself to the lower third of the spine of the posterior dorsal, but does not as in *Chanda gymnocephala* descend nearly down to the level of the back. From the individuals described by Buchanan, those inhabiting the sea differ slightly in colours, and in having one, rarely two, branched rays less in the posterior dorsal and anal fins. The species is at all seasons of no rare occurrence at Pinang. It feeds on small *Crustacea*.

The preceding species of *Apogon* and *Chanda* are of little value as articles of food. At Pinang they, as well as numerous other small fishes, the daily residue of the market, are used as manure.

GEN. SERRANUS, *Cuv. and Val.* 1828.

Dorsal fin single ; preopercle serrated ; opercle with two or three flat spines ; teeth velvety, with a greater or smaller number of longer, pointed teeth ; crown of the head, opercles, and cheeks covered with scales ; muzzle and jaws with more or less perceptible scales, or apparently naked.

SERRANUS HEXAGONATUS, (Forster.)

Perca hexagonata, Forster.

Holocentrus hexagonatus, Bloch. Schneider.

Serranus hexagonatus, Cuv. and Val. II. 330.

Serranus stellans, Richardson, Ann. Nat. Hist. March 1842.

Serranus hexagonatus, Richardson : Voy. Sulph. 82, Pl. 38, Fig. 1.

Ground colour of the head above, back and upper half of the sides pale reddish brown with numerous rounded, frequently confluent spots,

all indistinct and of a shade but slightly darker than the ground colour ; lower half of the sides diluted reddish brown, becoming whitish on the abdomen ; fins reddish brown, darker than the body from their numerous indistinct spots, the largest of which along the back between the dorsal spines ; upper margin of the dorsal membrane black ; all the spines greyish brown. Iris reddish brown, with a narrow golden ring.

D 11/17, C 17- $\frac{3}{8}$, A 3/8, V 1/5, P. 17, Br. VII.

HABIT.—*Sea of Pinang.*

Isles of Borabora and Oualan, South Pacific.

TOTAL LENGTH : 7 $\frac{3}{8}$ inch.

The length of the head is 3 $\frac{1}{4}$ of the total ; the vertical diameter at occiput is $\frac{2}{3}$ of the length of the head ; the greatest oblique diameter of the orbit is about 4 $\frac{1}{2}$ of the length of the head ; the margin of the preopercle is rounded, the ascending part strongly toothed, the three lowest teeth larger than the rest ; of the three spines of the opercle the upper one is the smallest, and the centre one the largest, its length equalling $\frac{1}{2}$ of the diameter of the eye ; the membranous portion of the opercle is elongated to a sharp point. The upper maxillary teeth are preceded on each side by a single curved canine, inside of which appear several pointed teeth, conspicuously longer than all the rest. The lower maxillaries have two canines on each side of the symphysis. All the fins are rounded ; the dorsal spines are rather slender and a little shorter than the soft rays ; the second anal spine is longer and stronger than any of the other spines, its length equalling the extent of the base of the anal fin. The greatest vertical diameter of the body slightly exceeds $\frac{1}{4}$ of the total length.

The stomach is moderate, coriaceous, particularly near the fundus ; the appendicula cœcopylorica are of equal length, about $\frac{5}{8}$ inch ; the length of the intestinal canal is a little less than the total. This species, of which a single individual occurred at Pinang in 1845, agrees with the description of *Serranus stellans*, Richardson, which the author later referred to *S. hexagonatus*. In the Pinang specimen the dark spots disappeared shortly after death, leaving behind a uniform reddish brown colour.

SERRANUS LANCEOLATUS, (Bloch.)

Holocentrus lanceolatus, Bloch. Pl. 242, Fig. 1.

Holocentrus lanceolatus, Shaw. IV. 567.

Russell, CXXX. Sugglathoo Bontoo.

Serranus lanceolatus, Cuv. and Val. II. 316.

Serranus lanceolatus, Bleeker: Verh. Batav. Gen. XXII. 9, 18, 35.

“Ikan Krapu” of the Malays.

Ground-colour of the body and fins bright gamboge, with five broad vertical brown or black bands, of which the first from the orbit over the preopercle, the second from the crown of the head obliquely over the opercle to behind the pectoral fins, where it joins the third; in the obliquely oval space between these two bands some individuals have a large oval black spot; the third band which occupies the space between the 2nd and 10th dorsal spine, becomes narrower on the body and continues jointly with the second band over the abdomen; the fourth band spans nearly the whole lower half of the dorsal rays, proceeds over the body and the anal, on the posterior part of which the ground colour is visible, with one or more black spots; the fifth band is in front of the caudal; all the fins with one or more series of large black spots, more or less confluent; the pectorals in some with three arched undulating black bands; jaws with large black spots. Pupil circular black; iris golden. In the young the ground colour is citrine or sulphur.

D 11/16, C $17\frac{1}{4}$, A $3/8$, V $1/5$, P 18, Br. VII.

HABIT.—*Sea of Pinang.*

Bay of Bengal, Batavia, Samarang.

TOTAL LENGTH: $6\frac{1}{8}$ inch.

In three individuals examined the number of fin rays was the above stated; Russell and M. M. Cuvier and Valenciennes give the dorsal 11/14, and the latter give the anal 3/10.

SERRANUS HORRIDUS, Kuhl and Van Hasselt.

Serranus horridus, Cuv. and Val. II. 321.

Serranus horridus, Bleeker: Verh. Bat. Gen. XXII. 7, 19, 36.

“Ikan Krapu” of the Malays.

Crown of the head and back blackish brown; sides and abdomen brownish grey, largely marbled with blackish brown; spinous part of the dorsal yellowish pale brown, with a large basal brownish spot, between each pair of spines; the rest of the dorsal gamboge, the lower half with three or four oblique downward directed blackish bands, above which some large round black spots; caudal, anal and ventral fins gam-

boge with large round, sometimes confluent, black spots; pectorals with a large black spot in the centre of the base, and three or four more or less interrupted arched black bands. Iris blackish brown with a golden ring.

D 11/15 or 16, C $17\frac{3}{5}$, A $3/8$, V $1/5$, P 17 or 19, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Java.

TOTAL LENGTH: 4 feet 3 inch.

This species is closely allied to *Serranus geographicus*, Kuhl and Van Hasselt, which according to M. M. Cuvier and Valenciennes has one or two additional soft rays in the dorsal, and two in the anal fin. It attains to a gigantic size. In one, the weight of which exceeded 130 lb., the stomach contained remains of *Stromateus*, *Sphyrna blochii*, and of a *Limulus*. Though not plentiful, it is not of uncommon occurrence at Pinang, where it is valued by the natives both in its fresh and dried state. In the adult the colour of the fins is greenish olive.

SERRANUS ALTIVELIS, Cuv. and Val.

Serranus altivelis, Cuv. and Val. II. 324, Pl. 25.

Cromileptes altivelis, Swainson, Nat. Hist. of Fishes, II. 201.

Serranus altivelis, Richardson: Report 1845, 230.

Serranus altivelis, Bleeker, Verh. Batav. Gen. XXII. 18, 33.

Head and body brownish buff changing to white on the abdomen; fins lilac-grey; all parts with distant round black spots, edged with white; those of the body and dorsal fins larger than the rest; iris brownish buff with a narrow golden ring, the upper part with two ocelli.

D 10/18, C $17\frac{2}{5}$, A $3/10$, V $1/5$, P 17, Br. VII.

HABIT.—*Sea of Pinang.*

Java, China Seas.

TOTAL LENGTH: $4\frac{6}{8}$ inch.

M. M. Cuvier and Valenciennes count 19 soft rays in the dorsal fin, but their figure represents 18; the latter is probably taken from a preserved specimen, and gives but an inadequate idea of the exquisitely delicate tints of the living fish. A single, probably young, individual observed at Pinang in June 1845, farther differs from Pl. 25, *Hist. Nat. des Poiss.* in having the dorsal spines from the third of equal length, whereas in the plate, their length is represented as gradually increasing from the first to the tenth. The very capacious stomach was expanded with remains of *Crustacea*.

SERRANUS BONTOO, Cuv.

Russell CXXVIII. Madinawa Bontoo.

Serranus bontoo, Cuvier R. A. II. 141, (3).

Serranus bontoo, Cuv. and Val. II. 334.

Serranus bontoo: Bleeker: Verh. Bat. Gen. XXII, 9.

Brownish grey, lighter on the abdomen; head and body with numerous round blackish spots; fin membranes brownish grey; the dorsal blackish at the base and upper half. Iris pale greenish olive with a narrow golden ring.

D 11/17, C 17 $\frac{5}{8}$, A 3/8, V 1/5, P 19, Br. VII.

HABIT.—*Sea of Pinang.*

Madras, Vizagapatam, Java.

TOTAL LENGTH: 5 inch.

A single individual with one soft anal ray less, but otherwise corresponding to the description and figure of Russell, was observed at Pinang in 1843. The lowest three teeth of the preopercle are larger than the rest. On each side of the intermaxillary bone appears a canine, stronger than the rest of the teeth. The black spots of the body become indistinct after death.

SERRANUS COIODES, (Buchanan Hamilton).

Russell CXXVII, Bontoo.

Bola? coioides, Buchanan Ham. 82, 369.*

Serranus suillus, Cuv. and Val. II. 335.

Serranus suillus, Bleeker: Verh. Bat. Gen. XXII, 9.

Head, body and fins reddish ash-coloured, whitish on the abdomen, with numerous rust-coloured or orange round spots, those of the dorsal sometimes confluent, forming one or two longitudinal bands. Iris pale golden with one or two rusty spots.

D 11/15, C 17 $\frac{3}{8}$, A 3/8, V 1/5, P 18, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Coromandel, Bay of Bengal, Gangetic estuaries, Java.

TOTAL LENGTH: 1 foot 6 inch.

This species grows to a gigantic size. Russell saw one 7 ft. in length, 5 in circumference, weighing more than 300 lb. Smaller individuals are highly valued as articles of food. It is not numerous at Pinang.

* An unfinished coloured sketch in the duplicate series of Buchanan's Drawings leaves no doubt of the species in question.

GEN. GENYOROGÉ,* *Cantor.**(Equivalent to DIACOPE, Cuvier.)*

Canines among the velvety maxillary teeth ; margin of preopercle toothed ; opercle generally terminating in two or three flat points ; margin of preopercle with a notch receiving a tuberosity of the interopercle.

GENYOROGÉ NOTATA, (Cuv. and Val.)

Russell XCVIII, Antika Doondiawah.

Diacope notata, Cuv. and Val. II. 422.

Mesoprion russelli, Bleeker : Verh. Batav. Gen. XXII. 20, 41.

Head above crimson ; cheeks golden, margin of preopercle pale carmine ; of opercle vermilion ; back reddish brown ; sides pale golden with red reflections ; abdomen yellowish white ; from the orbit, above the lateral line, three obliquely ascending orange lines, of which the lowest reaches the middle of the base of the dorsal rays ; beneath which a large black spot ; beneath the lateral line three or four parallel similar lines, of which the uppermost divides the black spot ; the rest nearly straight from the opercle towards the tail ; fin membranes yellowish ; apical third of dorsal spines and rays, and upper, lower and posterior margin of caudal fin crimson ; anal and ventral fins gamboge. Iris golden.

Young.—Head above and back brownish ; cheeks, sides and abdomen, silvery white ; stripes of the body brown ; fine pale yellow, points of dorsal rays and posterior margin of caudal fin pale crimson.

D 10/i4, C 17 $\frac{1}{4}$, A 3/8, V 1/5, P 16, Br. VII.HABIT.—*Sea of Pinang.*

Indian Ocean, Bay of Bengal, Batavia.

TOTAL LENGTH : 9 inch.

Russell gives 3/6 in the anal ; M. M. Cuvier and Valenciennes 11/13 in the dorsal fin. Russell has observed the changes of colour produced by age. On each side of the throat appear three small oval fossets, of which the posterior is the largest. The species is not numerous at Pinang.

GEN. MESOPRION, *Cuvier* 1829.

Teeth on the palate and vomer ; canines among the velvety maxillary teeth ; the middle of each side of the head armed with teeth like those of a saw.

* Γένυ, cheek ; βωγλή, cleft. Substituted for *Diacope*, Cuvier 1817, preoccupied by *Diacope*, Lübnér 1816, (*Lepidopt.*)

MESOPRION JOHNII, (Bloch.)

Camboto, Renard T. I. Pl. 31.

Anthias johnii, Bloch, IX. 97, Pl. 318.

Lutjanus johnii, Lacépède IV. 235.

Sparus tranquebaricus, Shaw IV. 471.

Russell XCVII. Doondiawah.

Coius catus, Buchanan Ham. 90, 369, Pl. 38, fig. 30.

Mesoprion unimaculatus, Quoy and Gaim. Zool. de Freyc. 304, Pl. 5.
fig. 3.

Mesoprion unimaculatus, Cuv. R. A. II. 143,⁽³⁾.

Mesoprion johnii, Cuv. and Val. II. 443.

Mesoprion unimaculatus, Cuv. and Val. II. 441.

Mesoprion unimaculatus, Richardson : Report 1845, 229.

Mesoprion unimaculatus, Bleeker : Verh. Bat. Gen. XXII. 4, 20, 42.

Head above and back greyish green, opercles silvery with golden edges ; sides silvery with numerous longitudinal blackish lines, produced by a central spot or line on each scale ; beneath the middle of the base of the dorsal rays a large black spot, in front of which, in some, two or three blackish vertical bands, terminating a little below the lateral line ; abdomen yellowish white or silvery ; fins reddish yellow ; upper margin of the membrane of the dorsal spines blackish ; of that of the rays and the posterior margin of the caudal fin pale carmine. Iris pale golden.

D 10/14, C $17\frac{3}{8}$, A $3\frac{3}{8}$, V $1\frac{1}{5}$, P. 16 or 17, Br. VII.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula.*

Indian Ocean, Bay of Bengal, Gangetic estuaries, island of Lantao (Canton River), China Seas, Celebes, Amboina, Batavia, Tagal, Samarag, Surubaya, Pasuruan.

TOTAL LENGTH : 10 inch.

The intensity of the black lateral spot and lines differs individually, and such which habitually live in brackish muddy water, have a general blackish hue, and two or three vertical blackish bands in front of the constant lateral spot. Such was the individual first described by Bloch as *Anthias johnii*, which denomination therefore takes precedence. M. M. Cuvier and Valenciennes, indeed, question the specific difference between the latter, and *Mesoprion unimaculatus*, and point out the identity of *Coius catus*, Buch. Ham. and the present species. The first

ventral ray is elongated, but it is frequently mutilated. In some, not in all individuals, the margin of the preopercle is so deeply indented, and the tuberosity of the interopercle so conspicuous, that they might be considered species of *Genyoroge*, and as such they were considered by Kuhl. On each side of the throat appear three small oval fossets as in *G. notata*. At Pinang this species is numerous at all seasons. It is insipid; the natives however dry it.

MESOPRION RANGUS, Cuv. and Val.

Russell XCIV. Rangoo.

Mesoprion rangus, Cuv. and Val. II. 481.

Mesoprion rangus, Cuv. R. A. II. 144,⁽³⁾.

Head, body and fins cherry- or indian-red, lighter on the sides and abdomen; the latter in some reddish white. Iris silvery carmine.

Young.—Head and back purple; cheeks and sides pale indian-red; abdomen reddish white.

D 10/13, 14 or 15, C $17\frac{3}{8}$, A $3\frac{3}{8}$, V $1\frac{1}{5}$, P 16, Br. VII.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula.*

Java, Coromandel.

TOTAL LENGTH: 1 foot 8 inches.

In the upper jaw appear on each side of the muzzle two canines, of which the posterior are very large, slightly curved; on each side of the lower jaw are four similar, conical and equidistant. In the adult of this as in other species, the teeth of the margin of the preopercle become worn and indistinct. The very large, scaleless, subrhombic infraorbital bone, affords a distinguishing character. According to Russell this fish is not much esteemed. At Pinang and Singapore, where single individuals occur at all seasons, it is of excellent flavour, and considered a great acquisition to the table. At Malacca it is plentiful, and in our settlements in the Straits it is known under the denomination of the "red rock-cod."

MESOPRION ANNULARIS, Cuv. and Val.

Mesoprion annularis, Cuv. and Val. II. 484, III. 497.

DiaCOPE annularis, Rüppell: Atlas, 74.

DiaCOPE annularis, Rüppell, Neue Wirb. Fische. 91.

Quoy et Gaimard, Astrol: Pl. 5, fig. 4.

Mesoprion annularis, Richardson: Rep. 1845, 229.

Mesoprion annularis, Bleeker: Verh. Bat. Gen. XXII., 4, 22, 47.

Head above and back brown with a crimson hue, paler on the cheeks and sides; abdomen silvery rose-coloured; across the back between the opercles, a broad forwards arched black band; in front of the root of the caudal fin, on each side, a large round black spot: both joined on the back, and both with a broad white margin, except on the back; dorsal spines crimson, the lower half of the rest of the dorsal fin reddish brown, the upper half crimson; the anterior half of the caudal fin reddish brown; posterior half pale crimson; the upper half of the anal silvery reddish brown, the rest black; the anterior third of the ventrals white, the rest black; pectorals pale rose-coloured. Iris golden with crimson hue.

Young.—Colours generally paler and the black marks less distinct.

D 11/13 or 14, C $17\frac{3}{3}$, A 3/9, V 1/5, P 16 or 17, Br. VII.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula.*

Indian Ocean, Massaua (Red Sea), Ceylon, China Seas, Batavia, Bantam, Cheribon, Samarang, Surubaya, Pasuruan, Patjitan, Celebes.

TOTAL LENGTH: 7 inch.

The brown oblique lines of the body, described by M. M. Cuvier and Valenciennes, do not exist during life, but appear after death, as the original colours fade. The ascending margin of the preopercle is very minutely toothed, but the lower part is very strongly so; the latter is arched, but there is scarcely any notch where it joins the ascending straight part. This species is distinguished by the beauty of its colours no less than by the symmetry of its forms. It feeds upon *crustacea*. A few occur at times at Pinang.

MESOPRION GEMBRA, (Bloch-Schneider.)

Alphestes samba, and *gembra*, Bloch-Schneider, page 236, Pl. 51, fig. 2.

Mesoprion gembra, Cuv. and Val. II. 485.

Mesoprion gembra, Cuv. R. A. II. 144, (3).

Upper part of the head and the back blackish brown; cheeks and sides silvery brownish grey; abdomen whitish; from occiput to the tail numerous (from 10 to 15) vertical brownish black bands, terminating near abdomen, with intervals narrower than the bands themselves; apical part of dorsal spines and margin of their membrane pale crimson; the membrane with a transversal central series of brownish spots; up-

per third of the rest of the dorsal fin pale blackish, central third whitish, basal pale yellowish brown; anterior third of the caudal fin pale yellowish brown, central whitish, posterior blackish; lower third of anal blackish, the rest successively as the caudal; pectorals and ventrals whitish, the lower half of the two anterior ventral rays, and their connecting membrane pale crimson, a large brownish central spot between the 2^d, 3^d and 4th ventral ray. Iris pale golden, blackish near the orbit.

Young.—Ground colour and black bands less distinct; between the dorsal rays some irregular series of brownish dots; posterior half of ventral fins blackish; no crimson on this nor the dorsal fin.

D 10/13 or 14, C $17\frac{2}{3}$, A $3/8$, V $1/5$ P 17, Br. VII.

HABIT.—*Rivulets of Pinang.*

Tranquebar.*

TOTAL LENGTH: $5\frac{2}{3}$ inch.

The anterior ventral ray is elongated, bristle-like. In the peculiar distribution of colours this species much resembles a *Datnia* from the estuaries of the Ganges described and figured by Buchanan Hamilton as *Coius polota*,† (pp. 25, 370, Pl. 38, fig. 31.) From the latter the present differs not only in the number of its branchiostegous- and fin-rays, but also by its more elongated form. But two individuals were at different times observed at Pinang: both were taken in rivulets, which however communicate with the sea.

MESOPRION CAROUI, Cuv. and Val.

Mesoprion caroui, Cuv. and Val. II. 489.

Russell CXXV. Karooi.

Head above and back reddish brown; cheeks and sides silvery brownish yellow; abdomen white; between the back and the lateral line a number of more or less distinct oblique brownish lines; from the posterior margin of the orbit a reddish light brown band to the tail; from the opercle four undulating reddish brown lines, converging towards the tail; fins brownish yellow. Iris brownish golden.

D 11/12, C $17\frac{5}{8}$, A $3/8$ or 9, V $1/5$, P 16, Br. VII.

* According to Bloch.

† Referred by M. M. Temminck and Schlegel as a second species of their genus *Anoplus*. The latter name however is inadmissible, as it has been preoccupied by *Anoplus*, Schönherr, 1826, (*Coleopt.*)

HABIT.—*Sea of Pinang.*

Madras, Vizagapatam.

TOTAL LENGTH, $4\frac{2}{3}$ inch.

Russell counted 9 anal rays : a single individual observed at Pinang had but 8. The margin of the preopercle is finely toothed, except at the angle where the teeth are stronger.

GEN. *NANDUS*, Cuv. and Val. 1831.

Mouth very protractile, with velvety teeth in both jaws, on the palate and vomer ; margin of preopercle and interopercle finely toothed ; spine of opercle very minute.

NANDUS MARMORATUS, Cuv. and Val.

Coius nandus, Buchan. Ham. 96, 370, Pl. 30, Fig. 32.

Nandus marmoratus, Cuv. and Val. VII, 482, Pl. 207.

(*Icon.*) *Bedula hamiltonii*, Gray, Ill. Ind. Zool. II. Pl. 88, Fig. 3.

Bedula nebulosus, Gray, *Ibid.* Fig. 2.

Coius nandus, McClelland, Calc. Jour. Nat. Hist. II. 574.

Head and body silvery or golden greenish olive, lighter on the sides ; cheeks and abdomen silvery with rose-coloured or orange reflections ; on the head and body large dark olive patches, edged with black dots, in some disposed like irregular vertical bands ; on the cheeks two or three such, radiating from the orbit ; in most a greenish black oval spot on the middle of the side of the tail ; spines and fin-membranes transparent, minutely dotted with black, marbled with pale brownish lake and greenish olive ; pectoral rays pale greenish olive, minutely dotted with black ; rest of the rays pale brownish red with transversal greenish black bars. Iris golden greenish olive, minutely dotted with black, with a narrow golden circle round the pupil ; upper orbital margin black.

D 13/12, C $12\frac{3}{8}$, A 3/7, V 1/5, P 16, Br. VI.

Rarely : D 12/13 or 13/11 or 14/12, C 17 or $18\frac{3}{8}$, A 3/8 or 9, P 17 or 18.

HABIT.—*Fresh water Malayan Peninsula.*

Bengal (in ponds), Sutlej, Chenaub (at Ramnuggur).

TOTAL LENGTH, 6 inch.

The length of the head is about $\frac{1}{3}$ of the total ; the vertical diameter at occiput is $1\frac{2}{3}$ of the length. The eye nearly borders the profile, the diameter is in the young $4\frac{1}{2}$, in the adult $\frac{1}{5}$ of the length of the head ; the distance from the muzzle is $1\frac{1}{2}$ diameter, from the flat mem-

branous point of the opercle $2\frac{1}{2}$ diameter. The openings of the nostrils are situated closely in front of the orbit. Between the centre of the supraorbital margin and the muzzle appear three distant fossæ; on the infraorbital bone two or three; beneath the symphysis of the lower jaw two pores, and behind them on each branch of the jaw two fossæ. The teeth are minute inwardly pointing, like those of a card; in the intermaxillaries they are placed 3 to 4 deep, but they become more crowded beneath the symphysis, where those of the innermost series are a little, yet perceptibly, longer than the rest. Such is also the case with those of the symphysis of the lower jaw, but on the branches they are placed in a single series, and are somewhat distant from each other. The vomer is raised into an acute angular crest, surmounted by a series of minute pointed teeth; the palatal, pharyngeal and those at the root of the flattened membranous tongue are very minute velvety. The greatest vertical depth of the body, at the seventh dorsal spine, is $\frac{3}{4}$ of the length of the head. The lateral line consists of a series of minute tubes, bifid at each extremity; it follows on the upper fourth of the side the arch of the back towards the termination of the dorsal, where it is suddenly interrupted, but it reappears lower down, and proceeds straight in the middle of the tail to the caudal. This fish is as numerous in the Malayan Peninsula as in Bengal. It is of voracious habits, preying upon small *Cyprinoidæ*, and as observed by Buchanan, is very tenacious of life. The longitudinal mark of the scales, described and figured by Buchanan, does not exist in the living fish, but appears after death. Buchanan Hamilton has correctly described the teeth: "intermixed with these, in each jaw, are several sharp teeth of a larger size." Such is the case in Bengal and Malayan specimens. Those examined by M. M. Cuvier and Valenciennes appear to have been defective in this character, and they therefore express some doubt about the identity of the species. As yet however, no other species of *Nandus* has been discovered. They have corrected the error of Buchanan in counting seven; instead of six branchiostegous rays. The figure of *Bedula nebulosa*, *Ill. Ind. Zool.* appears to be intended to represent the present species, but whether the defect is attributable to the original specimen, or to the copyist, is impossible to ascertain. The figure of *Bedula hamiltonii*, is inferior to that of Buchanan Hamilton, and the colours are those of a specimen preserved in spirits of wine.

GEN. THERAPON, *Cuv. and Val.* 1829.

Preopercle toothed, opercle terminating in a strong spine; dorsal fin deeply emarginated between the spinous and soft part; the external series of teeth stronger than the rest, conical; teeth of the vomer apt to fall out; airvessel divided by a stricture in two compartments.

THERAPON TRIVITTATUS, (Buchanan Ham.)

Russell CXXVI. Keelputa.

Coius trivittatus, Buchan. Ham. 92, 370.

Therapon puta, Cuv. and Val. III. 131, and 144, ("un thérapon, [le trivittatus].")

Icon. *Pterapon trivittatus*, Gray: Ill. Ind. Zool. II. Pl. 88, Fig. 1.

Pterapon trivittatus, (Syn. *Therapon theraps*) Richardson's Report, [1845, 238.

Therapon puta, Bleeker: Verh. Batav. Gen. XXII. 23, 50.

Head above and back pale greyish green, sides silvery, abdomen white; from the first dorsal ray to the middle of the base of the soft part a brownish or black slightly downward arched band; a second from the nape of the neck towards the root of the upper margin of the caudal fin; a third, paler, from the opercle to the centre of the caudal; fin-membranes white, upper half of the membrane between the six anterior dorsal spines, and in some between the ninth and tenth, black; the upper margin of the soft dorsal with one or two black spots; caudal with a central horizontal blackish band, above and below which two, more or less distinct, oblique black bands; posterior half of anal, and anterior half of ventral fins pale ochre. Iris golden; pupil broad lanceolate with the apex forward.

D 11/10, C 17 $\frac{4}{8}$, A 3/8, V 1/5. P 13, Br. VI.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula.*

Bay of Bengal, estuaries of the Ganges, Batavia.

TOTAL LENGTH, 6 inch.

This species is well marked by three or four teeth at the angle of the preopercle, conspicuously larger than the rest. Buchanan Hamilton describes *Coius trivittatus* (l. c. 93), as having "the four lower toothlets" (of the preopercle) "larger than the others." In his duplicate series of drawings is a correct representation of this species, marked in his handwriting as "*Holocentrus Katkaya*." Buchanan's drawing is evidently the original of the figure in Hardwicke's Illustrations

named *Pterapon trivittatus*. In the copy however, the distinguishing character is not represented, nor is Buchanan's name affixed to the specific. The incorrectness of the copy has caused Sir John Richardson to consider it as intended to represent *Therapon theraps*, Cuv. and Val., and he consequently placed, as a synonym of the latter, *Pterapon trivittatus*, "Gray," an entirely distinct species, first described by Buchanan Hamilton (Richardson : Report 1845, 238.)

M. M. Cuvier and Valenciennes count 12/10 or 10—1/10 in the dorsal, and 3/9 in the ventral fins. In colours the young resemble the adult, but the distinctness of the lateral bands varies individually in all ages, and in some they are greenish, instead of black. The young have velvety teeth on the vomer, but they disappear with age. In the Straits of Malacca the species is numerous at all seasons.

Therapon obscurus, Cuv. and Val.

Therapon obscurus, Cuv. and Val. III. 135.

Therapon obscurus, Bleeker : Verh. Batav. Gen. XXII. 23, 51.

Pale blackish or bluish silvery, with two broad longitudinal white bands on the sides ; abdomen white ; dorsal and caudal fins coloured like *T. trivittatus*, lower half of the anal and ventral fins blackish ; body and fins minutely dotted with black. Iris pale golden, black towards the orbit.

Young. Of a general darker colour than the adult.

D 12/10 or 11, C 17 $\frac{8}{8}$, A 3/3, V 1/5, P 13 or 14, Br. VI.

HABIT.—*Sea of Pinang*.

Indian Ocean, Batavia.

TOTAL LENGTH, 4 $\frac{2}{8}$ inch.

This species may readily be distinguished from the preceding by its shorter, broader shape, by the uniformly toothed preopercle, and the smaller spine of the opercle. From *Therapon squalidus*, Cuv. and Val. it differs in having but 7 cæcopyloric appendages. It is of rare occurrence at Pinang. In the young of this species as well as of *T. trivittatus*, the suprascapular and humeral bones are not crenulated, but they become so in the adult.

GEN. SILLAGO, Cuvier, 1817.

Head elongated, slightly pointed ; mouth small ; velvety teeth in the jaws and in front of vomer ; opercle terminating in a small point ; six branchiostegous rays ; two contiguous dorsal fins, of which the an-

terior with thin spines, the posterior is long and little elevated.

SILLAGO MALABARICA, (Bloch. Schneider.)

Sciæna malabarica, Bl. Schn. Pl. 19.

Russell CXIII. Soring.

Sillago malabarica, Cuv. R. A. II. 149.

Sillago acuta, Cuv. and Val. III. 400.

Sillago acuta, Bleeker: Verh. Batav. Gen. XXII. 25, 61, 4.

“Ikan Ubi” of the Malays of Pinang.

Head above pale reddish purple; cheeks pale orange; opercles bluish silvery; back pale greenish; sides pale reddish silvery, with a silvery longitudinal band beneath the lateral line; abdomen mother-of-pearl; membrane of dorsal fins with some minute oblique black lines, particularly near the anterior margin of the spines and rays, where they in some form faint blackish vertical lines; the rest of the fins whitish or pale yellowish. Iris pale golden.

D 10 or 11—1/21, C 17 $\frac{1}{7}$, A 1/23, V 1/5, P 15, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Bay of Bengal, estuaries of the Ganges, Macao, Bantam, Batavia, Tjilatjap, Samarang, Surabaya, Passuruan, Bangkallang, Makassar, Celebes, Sumbawa.

TOTAL LENGTH, 1 foot.

Although this species occurs at Pinang in numbers at all seasons, it is never very plentiful. *Sillago domina*, Cuv. and Val. which is very numerous at Pondicherry, Madras, and indeed as far north as the mouths of the Ganges, appears to be unknown at Pinang and Singapore. The length given of the present species is the greatest observed, but M. Leschenault has seen single individuals upwards of three feet.

GEN. *URANOSCOPIUS*, Gronov. 1754.

Head large, depressed, rough; eyes and mouth vertical; lower part of preopercle crenate; shoulder with a strong spine; branchiostegous rays six; dorsal fins two, or both united into one; vent central.

URANOSCOPIUS COGNATUS, Cantor.

Head above and back pale brownish green, cheeks, sides and abdomen silvery, minutely dotted with black; jaws blackish; anterior dorsal fin black, near the base clouded whitish; posterior dorsal whitish, minutely dotted with black between the branches, and along the upper half of the rays; caudal bright gamboge; the membrane

between the branched part of the rays white, and along the branches minutely dotted with black; anal and ventral fins white; pectorals white, minutely dotted with black, the apex of each ray scarlet. Iris pale golden green, blackish towards the orbit; pupil very minute, like a brilliant black point.

D 3—1/15, C 12 $\frac{4}{4}$, A 14, V 1/5, P 18, Br. VI.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH, 5 $\frac{1}{8}$ inch.

Except in colours and in the number of fin-rays, this species so closely resembles *Uranoscopus scaber*, Linné, that it will be sufficient to point out the differences. The eyes are vertical, and the very small circular pupils are directed upwards, but the level of the orbit is somewhat sloping, the outer margin being lower than the inner; the orbit itself is oval, its greatest diameter, equalling the distance between the eyes across the vertex, is oblique, slightly diverging forward from the medial line of the vertex. The length of the head from the lower jaw to the nape of the neck slightly exceeds $\frac{1}{5}$ of the total, but measured to the apex of the opercle it slightly exceeds $\frac{1}{4}$ of the total length. The anterior process of the infraorbital bone covering the maxillary, terminates in an obliquely downward pointed spine, which is rugged or shagreened like the rest of the covering of the head. The lips have a series of close fleshy papillæ. The upper maxillary teeth are in two series, of which the outer is the more minute, those in the centre of the inner series are stronger than the rest; the lower jaw has on each side four or five long, distant, recurved teeth; on the symphysis they are closer, in two series, of which the inner contains the longer teeth. The four spines of the lower margin of the preopercle are placed by a central interval in two pairs: an anterior, and a posterior. Of the four indentations or shallow depressions of the ascending margin, the uppermost is the smallest. The lower part of the posterior margin of the opercle has a finely toothed appearance, produced by some oblique ridges terminating there. The strong vertical spine of the subopercle is on a level with the four spines of the preopercle. In front of the anterior of the latter is a small broad triangular spine. Between and beneath the angles of the lower jaw appear on each side three forward pointed spines, of which the superior, the longest, is directed obliquely downward, and touches

the opposite one ; the other two pairs are vertical, the posterior being the shorter. The scapular spines are small, but distinct ; the humeral spine is very strong, triangular and longitudinally furrowed like a bayonet ; its length is little less than $\frac{1}{2}$ of the pectoral fin, or equal the upper margin of the opercle. The length of the pectorals equals $\frac{1}{5}$ of the total ; the inferior eight rays are thicker than the rest. The ventrals are less than $\frac{1}{9}$ of the total. The anterior dorsal is triangular, its height less than $\frac{1}{5}$ of the vertical diameter of the body, which is contained about $4\frac{1}{2}$ times in the total length. The posterior dorsal commences with a short, thin spine, which so closely reclines towards the back, that it easily may escape observation ; the first three rays are undivided, gradually increasing in length ; the fourth is the longest, about $\frac{2}{3}$ of the vertical diameter of the body ; the fifth and sixth are shorter ; the rest nearly equal about $\frac{1}{2}$ of the length of the fourth ray. The rays of the anal fin are somewhat shorter, but not thicker than those of the posterior dorsal. The precise shape of the fin could not be ascertained, as it happened to be somewhat mutilated in the only individual observed. The naked space, behind the posterior dorsal and that behind the anal, is a little more than $\frac{1}{12}$ of the total length ; the caudal is about $\frac{1}{5}$. The space on the back between the lateral lines is covered with scales like those of the rest of the back, sides, and the posterior half of the abdomen ; the anterior half of the latter and the chest are apparently naked. Of the Asiatic species, described by M. M. Cuvier and Valenciennes, the present nearest approaches *U. marmoratus*, which differs in colours, in the smaller humeral spine, in having five preopercular teeth, the space between the lateral lines naked, and the skull is shagreened but on the posterior part only. The capacious, leathery stomach contained remains of minute *Crustacea* and mud ; its length ($4\frac{1}{8}$ inch.) a little less than $\frac{1}{6}$ of the total ; that of the intestinal canal $4\frac{1}{8}$ inch. There were eight cæcopyloric appendages. The gall-bladder excessively large, elongated, bottle shaped, in length nearly equalling the stomach, transparent pale greenish. The fishermen of Pinang asserted this species to be of very rare occurrence and to grow but little larger.

GEN. SPHYRÆNA, *Artedi*. 1738.

Body elongated with two separated dorsal fins, head oblong, with the lower jaw projecting in a point beyond the upper ; some of the

teeth large, pointed, trenchant; preopercle not toothed; opercle without spines; branchial rays seven; cæcopyloric appendages numerous.

SPHYRÆNA JELLO, Cuv. and Val.

Russell CLXXIV. Jellow.

Sphyræna jello, Cuv. and Val. III. p. 349.

Sphyræna jello, Bélanger, Voy. Zool. p. 346, Pl. I. Fig. 1.

Sphyræna jello, Rüppell, N. W. Fische, p. 98.

? Sphyræna jello, Bleeker: Verh. Batav. Gen. XXII. 24, 56, 4.

Head above and back dark greyish green, forming on the upper part of the sides a festooned band, intersecting the lateral line; cheeks and sides pale silvery, abdomen white; ventral fins whitish, the other fins pale yellowish; dorsals, caudal and pectorals minutely dotted with black near the margins. Iris pale golden, blackish near the orbit.

D 5—1/9, C 17 $\frac{8}{9}$, A 1/8 or 9, V 1/5, P 13 or 14, Br. VII.

HABIT,—*Sea of Pinang, Singapore.*

Bay of Bengal, Red Sea.

TOTAL LENGTH, 1 foot 6 inch.

The length of the head is $3\frac{1}{2}$ of the total, taken from the symphysis of the lower jaw to the centre of a vertical line cutting the lobes of the caudal; but taken from the symphysis to the centre of the caudal itself, the head is $3\frac{1}{3}$ of the total. The horizontal diameter of the oval eye is $\frac{1}{5}$ of the length of the head. The opercle terminates in two small, flat, membranous points.

At Pinang a few at the time occur at all seasons. The length given is the common, but according to Russell an individual of 4 feet has been observed. In one examined the stomach contained remains of *Trichiurus*. The airvessel is long, cylindrical.

SPHYRÆNA OBTUSATA, Cuv. and Val.

? Sphyræna chinensis, Lacépède, Pl. 10, Fig. 2

Sphyræna obtusata, Cuv. and Val. III. 350.

? Sphyræna obtusata, Bleeker: Verh. Batav. Gen. XXII. 24, 56, 4.

Head above and back dark greyish green, paler on the upper part of the sides, and clouded beneath the lateral line, cheeks and the rest of the sides pale silvery; abdomen white; pectorals and ventrals whitish, the other fins and the iris like *S. jello*.

D 5—1/9, C 17 $\frac{5}{9}$, A 1/9, V 1/5, P 13, Br. VII.

HABIT.—*Sea of Pinang, Singapore.*

Port Jackson, Isle of France, Malabar, Pondicherry,
Batavia, Surabaya.

TOTAL LENGTH : 2 feet 6 inch.

The length of the head from the symphysis to the centre of the posterior caudal margin is about $\frac{1}{3}$ of the total length. The horizontal diameter of the oval eye is $\frac{1}{4}$ of the length of the head: the eye consequently appears comparatively larger than in *S. jello*. The opercle terminates in a single flat, membranous point; the preopercle is not rounded, but almost rectangular; the symphysis of the lower jaw is obtuse, and less prominent than in *S. jello*. There are but three longer teeth (the second, third and fourth,) in front on each side of the palatals; the rest are all uniformly small. The ventral fins are not situated opposite the anterior dorsal, at the termination of the pectorals, but in front of the anterior dorsal, opposite the posterior half of the pectorals. The caudal fin is less deeply cleft than in *S. jello*. At Pinang a few individuals occur at all seasons.

GEN. POLYNEMUS, *Gronov.* 1754.

(PENTANEMUS, *Artedi.*)

Head compressed, covered with scales; muzzle obtuse, prominent; branchiostegous rays 7; pectoral fins with distinct appendages.

POLYNEMUS TETRADACTYLUS, *Shaw.*

? *Trigla asiatica*, Linné, *Syst.* 1345.

Russell CLXXXIII. *Maga Jellee.*

Polynemus tetradactylus, *Shaw*, V. 155.

Polynemus teria, *Buchan. Ham.* 224, 381.

Polynemus tetradactylus, *Cuv. and Val.* III. 375.

(*Icon.*)—*Polynemus teria*, *Gray* : *Ill. Ind. Zool.* I. Pl. 92, Fig. 2.

Polynemus salliah, *Cantor* : *Journ. Royal As. Soc.* V. 166.

Polynemus quadrifilis, *Cantor* : l. c.

Polynemus tetradactylus, *Swainson* : *Nat. Hist. Fish.* II, 234.

Polynemus tetradactylus, *McClelland* : *Journ. As. Soc.* VIII.

Polynemus tetradactylus, *Royle* : *On Isinglass*, 25, 26.

Polynemus tetradactylus, *Penny Cyclop.* Vol. XVIII. p.
360, Note.

Polynemus tetradactylus, Richardson, Report 1845, 218.

Polyuemus tetradactylus, Bleeker : Verh. Batav. Gen. XXII.
24, 57.

Ikan Salangan, 'Sinanghi,' or 'Salanghi' of the Malays,

Head silvery; back and sides silvery green; the latter beneath the lateral line, silvery; abdomen white; pectoral, ventral and anal fins gamboge or pale orange; dorsals and caudal greyish, minutely dotted with black, their margins broad blackish; filaments white; iris silvery, metallic green at the upper part of the orbit.

D 8 or 9— $1/14$ or 15, C $17\frac{8}{8}$, A 3 or $4/15$ or 16, V $1/5$, P 17, Filaments 4, Br. VII.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula, Lancavy.*

Bay of Bengal, Gangetic estuaries; Australia, China, Bantam, Batavia, Tjilatjap, Samarang, Surabaya, Bangkallang.

TOTAL LENGTH: 4 feet.

It is highly valued as an article of food, its flavour being compared with that of salmon. In the Straits of Malacca single individuals occur at all seasons, but it is there not numerous as it is in the Bay of Bengal, and the Gangetic estuaries, nor of such gigantic dimensions as Buchanan Hamilton describes it to attain in the latter locality. Some individuals which in 1837 were observed in the Bay of Bengal, and by the native fishermen denominated *Salliah* or *Saccolih*, I was induced to consider as belonging to a distinct, although closely allied species, (*P. salliah*.) as they all agreed in presenting one dorsal, and two anal-spines more than were attributed to *P. tetradactylus*. The following is the number of fin-rays given by the different describers:

Russell : D 8— $1/14$, C 22? A $1/16$, V $1/5$, P 17.

Buchanan : D 8— $1/14$, C 15+, A $2/15$, V $1/5$, P 17.

Cuv. and Val. : D 8— $1/15$, C 17, A $1/16$, V $1/5$, P 17.

The first anal spine is very minute, and as well as the succeeding one or two almost hid by scales, particularly in larger individuals. Although the figure of this species in Buchanan Hamilton's duplicate drawings represents the anal fin with *four spines* and fifteen rays, his description gives but $2/15$. The length of the filaments is liable to individual variation, and in the adult they are comparatively shorter than in the young. Normally the two posterior are the longest, equalling the length of the head; the first is but $\frac{2}{3}$ of the fourth.

The ascending margin of the preopercle is very finely toothed, but the lowest tooth is conspicuously larger than the rest. The lateral line is nearly straight from its posterior half. From the base of the caudal it continues sloping a little downwards on the lower half of the fin, and divides in two or three horizontal branches, which reach the margin of the fin. A little behind the place where the cystic and hepatic ducts jointly enter the duodenum, the latter sends forth three branches which again terminate in innumerable cœcopyloric appendages. This species, as first observed by M. M. Cuvier and Valenciennes, has no air vessel.

POLYNEMUS PLEBEIUS, Broussonnet.

Polynemus plebeius, Emoi, Broussonnet : Fasc. I. Pl. 7.

Polynemus plebeius, Linné, Syst. 1401.

Bynni, Bruce, Appendix.

Polynemus plebeius, Bloch.

Polynemus lineatus, Lacépède V. 409, Pl. 13, Fig. 2.

Polynemus plebeius, Shaw, V. 150, Pl. 125, Bynni Carp.

Polynemus niloticus, Shaw, *ibid.* 151.

Polynemus commersonii, Shaw, *ibid.* 156.

Polynemus plebeius, Cuv. and Val. III. (380. *Excl. Syn. P. sele,*
Buchan.)

Polynemus plebeius, Temminck and Schlegel : Fauna, Jap. Pisc, 29,
Pl. XI. Fig. 1.

Polynemus plebeius, McClelland, Cal. Journ. of Nat. Hist. Vol.

III. p. 185, (*Excl. Syn. P. sele and the accomp. Pl. VI. P. sele.*)

Polynemus plebeius, Richardson : Report 1845, 219, (*Excl. Syn.*
P. sele.)

Polynemus plebeius, Bleeker, Verh. Batav. Gen. XXII. 25, 58.
(*Excl. Syn. P. sele.*)

Head above and back greenish grey, or pale bluish silvery ; sides pale silvery ; abdomen white ; fins whitish grey, minutely dotted with black ; dorsals, caudal and pectorals with pale blackish margins. Iris silvery, metallic green at the upper part of the orbit. Filaments white.

D 8—1/13 or 14, C 17 $\frac{2}{3}$, A 3/12 or 13, V 1/5, P 13 or 14, Filaments 5, Br. VII.

HABIT.—*Sea of Pinang.*

Otaheiti, Isle of Tanna, Isle of France,

Coast and estuaries of Coromandel, Japan, Polynesia, Batavia, Samarang, Surabaya, Sampang, Madura.

TOTAL LENGTH, 1 foot :

The length of the head is $\frac{1}{4}$ of that of the body, measured from the muzzle to the centre of the caudal margin ; but in the length taken from the muzzle to the centre of a vertical line cutting the lobes of the caudal, that of the head is contained $4\frac{1}{2}$ or five times, according to the individually varying length of the caudal fin. The horizontal diameter of the eye is contained $3\frac{1}{2}$ times in the length of the head. The preopercle is more finely toothed than it is in *P. tetradactylus* : the lowest tooth is longer than the rest. The anterior dorsal fin commences opposite the posterior extremity of the opercle, the extent of the base being $\frac{2}{3}$ of the length of the third spine. The posterior dorsal commences a little in front of the anal, the extent of its base equalling the length of the third dorsal spine. The distance between the two fins exceeds by $\frac{1}{4}$ the extent of the base of the anterior dorsal, while it is but little less than the extent of the base of posterior dorsal. The two or three posterior filaments are longer than the pectoral fin. The lateral line is nearly straight towards the root of the caudal, over which it extends in a downward slightly oblique direction to a little beneath the cleft. The caudal fin is more or less deeply cleft, the upper lobe in some individuals is longer than the lower ; both are pointed, but neither terminates in a filament. In a fresh state no longitudinal dark lines appear on the body, but in the young three or four of the scales of the lateral line near its origin, are densely dotted with black, so as to appear like a blackish serrated spot. The individuals observed at Pinang differ from the description of *P. plebeius* by M. M. Cuvier and Valenciennes in having three or four pectoral rays less, and three anal spines instead of two, but the first of the three is so short, and so hid by the scales, that it easily may escape observation. In other external characters there is no difference, and they also agree in presenting a great number of cœcopyloric appendages, and in having an elongated narrow airvessel, *without appendages*. At Pinang this species is of rare occurrence, and of the few observed, the largest measured but one foot in length. Its value as a fish yielding isinglass requires to be ascertained in localities which it frequents, and where it attains its full size : 4 ft.

POLYNEMUS INDICUS, Shaw.

Russell CLXXXIV. *Maga Booshee*.

Polynemus indicus, Shaw, V., 155.

Polynemus sele, Buchanan, 226, 381.

Polynemus uronemus, Cuv. and Val. III. 385.

Polynemus indicus, Swainson, Nat. Hist. Fish, II. 234.

Polynemus sele, McClelland, Journ. As. Soc. Vol. VIII. p. 203, Plate.

Polynemus sele, Cantor, Proc. Zool. Soc. Pt. VII.

Polynemus sele, McClelland, } Cal. Journ. N. II. Vol. II. p.

Polynemus ploteus, McClelland, } 450.

Polynemus plebeius, McClelland,

Polynemus sele, McClelland,

Polynemus lineatus, McClelland,

Polynemus gelatinosus, McClelland, }

} Ibid Vol. III. pp. 179, 181,
Pl. VI.

Polynemus uronemus, Bleeker, Verh. Batav. Gen. XXII. 25, 58.

Ikan Kúrow of the Malays.

Head above dark bluish, or greyish, lighter greyish on the sides; abdomen white; opercle bluish silvery with a blackish spot on the upper half; the body everywhere more or less densely dotted with black; pectorals black, the other fins greyish or bluish white, dotted with black, often so densely as to give the dorsals, ventrals, the anal and the caudal a blackish appearance; the filaments of the caudal lobes black; the anterior half of the pectoral filaments white, the posterior blackish. Irish silvery.

D 8—1/13 or 14, C $17\frac{?}{2}$, A 3/11 or 12, V 1/5, P 13 or 14, Filaments 5, Br. VII.

HABIT.—*Sea of Pinang, Singapore, Malayan Peninsula.*

Pondicherry, Madras, Vizagapatam, estuaries of the Ganges,
Surabaya.

TOTAL LENGTH: 3 feet.

The length of the head is contained about $3\frac{1}{2}$ times in that of the body, measured from the muzzle to the centre of the caudal margin. The horizontal diameter of the eye is about $\frac{1}{3}$ of the length of the head. The ascending margin of the preopercle is more strongly toothed than in *P. plebeius*, the lowest tooth being the longest. The anterior dorsal commences behind the termination of the opercle, opposite the second half of the pectoral fin, the extent of its base

being nearly equal to the length of the fourth spine. The posterior dorsal commences considerably in front of the anal, the extent of its base equalling the third dorsal spine. The distance between the two fins is nearly equal the base of the anterior dorsal. The two or three posterior or upper filaments are longer than the pectoral fins. In the young they are comparatively larger: one or two reaching to the anal fin. The lobes of the caudal fin are unequal, the lower being, generally, but not always, the longer. The length of the caudal filaments is greater in the very young, in which the lower almost equals the length of the body. The lateral line proceeds nearly straight to the centre of the root of the caudal, from whence it is continued obliquely downwards over the lower lobe. The most striking character by which this species at once may be distinguished from *P. plebeius* is the structure of the airvessel, of which M. M. Cuvier and Valenciennes observe: "its membrane is silvery, thick, the general form oval. It occupies the whole length of the stomach, terminating behind in a very sharp point, which penetrates the thick of the tail over the first interspinal of the anal. It adheres to the third, fourth, fifth, sixth and seventh abdominal vertebræ. From both sides towards the ventral surface, proceed twenty-eight to thirty-five appendages, which, with the exception of the three last ones, have two roots, but terminate in a single sharp point. Above each of these, towards the dorsal surface, appear one or two others. All the appendages penetrate the thick of the muscles, and are slightly directed towards the back of the fish." (Hist. Nat. des Poiss. T. III. p. 285.) Also this species is distinguished by a very great number of cœcopyloric appendages, divided in two portions: one containing the longer and larger, adheres to the stomach, the other to the intestine. At Pinang single individuals occur at all seasons, but numbers are taken from June to August. The weight is commonly from 4 to 6 lb, seldom exceeding 20. The airvessel of a good-sized fish when dried, and ready for the market in China, weighs upwards of 2 ounces, is considered very good isinglass, and fetches 25 to 30 Spanish Dollars per Pikul. The fish itself is valued as an article of food, although less so than *P. tetradactylus*.

Synonymy of Polynemus indicus.

Russell, the first describer of this species, has also published the only correct figure, No. CLXXXIV. His formula of the fin-rays is:

D 8—1/14, C 20, A. 3/13, V 1/5, P 17.

Shaw, quoting the description of *Russell*, named the species *P. indicus*, which denomination, however objectionable, claims priority.

Buchanan Hamilton described this species as *P. sele*, which he observed strongly resembles the description of *Russell's* No. CLXXXIV. but he strangely misunderstood *Russell's* formula of the anal fin, so as to believe that it expressed "two fins behind the vent," and concluded that *P. sele* must be identical with *P. plebeius*. As to the identity of *P. sele*, there can be no doubt, as there exists in the duplicate series of *Buchanan's* drawings, a coloured figure, which although not quite correct, it is but justice to add, is far superior to the two copies of the drawing published by *Mr. McClelland*.

M. M. Cuvier and Valenciennes, who could judge of *P. sele* but by the in part erroneous description of *Buchanan*, admit on his authority its identity with *P. sele*, not however without expressing a doubt.

Mr. McClelland, in *Journ. As. Soc.* Vol. VIII. p. 203, published a description of "*Polynemus sele*," and a copy of the drawing in *Buchanan's* duplicate series. The fin-rays are given as follows :

D 7—14, C 20 (?), A 12 or 13, V 6, P. 13.

The airvessel is described as "a large spindle-shaped organ about half the length of the fish, thick in the middle and tapering towards the extremities where it ends in front by two, and behind by a single tendinous cord; similar small tendinous attachments, about twenty-two in number, connect it on either side to the upper and lateral parts of the abdominal cavity." The characteristic form of this organ was first observed by *M. M. Cuvier and Valenciennes*, and a reference to their description of *P. uronemus* (*P. indicus*, *Shaw*) might have proved the identity of that and *P. sele*. Notwithstanding the distinctive character presented by the airvessel of this species, *Mr. McClelland* in an editorial "On the East Indian Isinglass" (*Cal. Journ. of Nat. Hist.* Vol. III. p. 179) asserts, "*Polynemus plebeius*, *P. lineatus* and *P. sele* are names which have been proposed by different authors for the same species," and suggests as a more appropriate name a new one of his own: *P. gelatinosus*. *Mr. McClelland* quotes a translation of the description of *Polynemus plebeius*, by *M. M. Cuvier and Valenciennes*, in which it is distinctly observed, that this species "has a very large swimming bladder, thin, and without appendages."

Yet Mr. McClelland, by way of illustrating the description of this species *without appendages to the air vessel*, has republished a copy of Buchanan's drawing of *P. sele* (l. c. Pl. VI.) the airvessel of which Mr. McClelland himself had previously (Journ. As. Soc. Vol. VIII. l. c.) described as presenting on either side about "*twenty-two tendinous attachments.*" Thus, in a paper avowedly written to call attention to the airvessel (the isinglass) of one species, and to instruct the reader how to distinguish this species from others, not only are two species confounded, but the confusion is increased by publishing a description of a species, totally distinct from the one intended to be described, and by illustrating that description by means of a figure of another, different species.

POLYNEMUS SEXTARIUS, Bloch, Schneider.

Polynemus sextarius, Bl. Schn. 18, Pl. 4.

Polynemus sextarius, Cuv. and Val. III. 388.

Polynemus sextarius, Bleeker, Berh. Batav. Gen. XXII. 59.

Young. Head above and back yellowish green, lighter on the sides; abdomen pale silvery; opercle silvery with a blackish spot; another black spot, nearer the back, between the head and the anterior dorsal; fin-membranes greyish white, minutely dotted with black towards their free margins; filaments white. Iris silvery, black towards the upper part.

D 8—1/12, C $17\frac{1}{10}$, A $3/12$, V $1/5$, P 14, Filaments 6, Br. VII.

HABIT.—*Sea of Pinang.*

Tranquebar, Coromandel, Batavia.

TOTAL LENGTH: 4 inch.

The length of the head is $\frac{1}{4}$ of the total measured from the muzzle to the centre of the posterior caudal margin. The orbit is oval obliquely situated: its greatest diameter, parallel to the upper jaw, is $\frac{1}{3}$ of the length of the head. The ascending margin of the preopercle is finely toothed, the lowest tooth longer than the rest. The length of the third dorsal spine, the longest, is little less than the greatest vertical diameter of the body; the length of the second dorsal spine equals the extent of the base of the anterior dorsal fin. In height the fin itself slightly exceeds the posterior. The lateral line is nearly straight; from the root of the caudal it deviates a little downwards

proceeding to the posterior margin of the lower lobe. The filament nearest the pectoral is a little longer than the rest, its length nearly equalling that of the head; the other five are nearly equal. A solitary individual occurred at Pinang in 1843. As observed by M. M. Cuvier and Valenciennes, the airvessel is excessively small, pointed at both extremities, of the shape and size of a grain of oats.

POLYNEMUS HEXANEMUS, Cuv. and Val.

Polynemus hexanemus, Cuv. and Val. III. 389.

Polynemus hexanemus, Bleeker: Verh. Batav. Gen. XXII. 25, 59.

Head above and back yellowish green, abdomen pale silvery; fin-membranes pale yellow minutely dotted with black, particularly the pectoral fins which have a black appearance; filaments white. Iris silvery, dotted with black towards the upper orbital margin.

D 8—1/12, C 17 $\frac{5}{8}$, A 3/11, V 1/5, P 13, Filaments 6, Br. VII.

HABIT.—*Sea of Pinang.*

Batavia, Samarang, Pasuruan.

TOTAL LENGTH: 4 inch.

The length of the head is $\frac{1}{4}$ of the total, measured from the muzzle to the centre of the posterior caudal margin. The orbit is oval, situated as in *P. sextarius*: its greatest diameter is contained $3\frac{1}{2}$ times in the length of the head, in consequence of which the eye appears comparatively smaller than in the preceding species. The ascending margin of the preopercle is finely toothed, the lowest tooth being stronger than the rest. The first dorsal spine is minute and almost hid by the scales. The length of the third and fourth dorsal spines, the longest, are but about $\frac{2}{3}$ of the greatest vertical diameter of the body. The length of the second dorsal spine is a little less than the extent of the base of the anterior dorsal fin. In height the fin itself is somewhat less than the posterior, the reverse of which is the case in *P. sextarius*. At the root of the caudal fin the hitherto straight lateral line deviates a little downwards, and then again continues straight towards the centre of the margin. The scales of the body have a short raised line in the centre, producing series of continued lines parallel to the lateral. The second, third and fourth filaments from the pectoral fin, are the largest, greatly exceeding the length of the head, almost extending to the anal fin; the rest are nearly equal, somewhat shorter. From the description of M. M. Cuvier and Valenciennes,

founded upon a drawing by M. M. Kuhl and Van Hasselt, the present principally differs in the comparative shortness of the 2nd, 3^d, and 4th pectoral filaments. Although not extending to the caudal fin, they are the longest, and thus retain the relative dimensions. As these organs are liable to individual variations in all the other species, there appears no reason to doubt the identity of the present and *P. hexanemus*. From *P. xanthonemus*, Cuv. and Val. the present differs in the lineated scales, and in the length of the caudal lobes, being more than $\frac{1}{3}$ of the total. A single individual was observed at Pinang in 1844.

POLYNEMUS HEPTADACTYLUS, Cuv. and Val.

Polynemus heptadactylus, Cuv. and Val. III, 390.

Polynemus heptadactylus, Bleeker: Verh. Batav. Gen. XXII. 25, 60.

Head above and back yellowish green; sides beneath the lateral line and abdomen pale silvery; fin-membranes pale yellow, minutely dotted with black, particularly the pectoral fins which have a black appearance; filaments white; the points of the four superior, nearest the pectorals, bright yellow. Iris silvery, blackish towards the upper margin of the orbit.

D 8—1/12, C $17\frac{1}{10}$, A 3/11, V 1/5, P 13, Filaments 7, Br. VII.

HABIT.—*Sea of Pinang.*

Batavia, Cheribon, Samarang.

TOTAL LENGTH: $4\frac{4}{8}$ inch.

In colours, general outline, and relative proportions this species so greatly resembles *P. hexanemus* that no difference can be assigned, but the additional seventh filament. The straight lateral line deviates slightly downwards at the root of the caudal; on the middle of the fin it divides in two parallel branches, which terminate in the centre of the posterior margin. The scales have a raised central line, forming series of continued lines, parallel to the lateral line. The two filaments nearest the pectoral fins and the seventh are equal, shorter than the other four which extend to the anal fin. The ascending margin of the preopercle is toothed as in *P. hexanemus*. According to M. M. Cuvier and Valenciennes the present in forms and colours so closely resembles the American species: *P. plumieri*, (Lacép),* that they

* *P. virginicus*, Linné?—*P. paradisæus*, Bloch.—*Polydactylus plumieri*, Lacép.—*P. americanus*, Cuv. and Val.

can assign no distinguishing characters.—Nevertheless, the two are specifically distinct. The American species is described as having a large, thin air-vessel, without appendages, and numerous small cæca. *P. heptadactylus* has but four rather large cœcopyloric appendages, and no airvessel. At Pinang it is of very rare occurrence. Of three individuals observed, none exceeded the length given.

GEN. MULLUS, Linné 1766.

SUB. GEN.—HYPENEUS, Cuvier, 1829.

Resembling *Mullus*, but with teeth in both jaws; some with velvety teeth on the palate and vomer; opercle generally terminating in a sharp point.

1. *With velvety teeth in both jaws, on the palate and vomer.*

HYPENEUS VITTATUS,* (Forskål) VAR.?

Young. Head above and back pale bronze, with a whitish band above the lateral line, along which the ground colour appears like a bluish line; sides and abdomen pale silvery; a yellow longitudinal band from the posterior angle of the eye, at first beneath the lateral line, which it intersects a little in front of the caudal fin; a second paler yellow band from the pectoral to the root of the caudal; cheeks and opercles silvery; opercle with a pale crimson spot continued obliquely down the preopercle; a second smaller spot over the point of the opercle and the root of the pectoral; dorsals with two or three transversal blackish bands; caudal pale yellowish with a broad blackish margin; pectorals white; rays of anal, ventrals and the gular filaments pale yellow. Iris pale golden.

Older. Head above Indian red, continued on the back; cheeks and opercles silvery rose-coloured; caudal pale orange with a broad blackish margin. Iris golden crimson.

D 8—1/8, C 15 $\frac{4}{5}$, A 1/6 or 7, V 1/5, P 15 or 16, Br. IV.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 5 inch.

* *Mullus vittatus*, Forskål Fauna Arab. 31, No. 28.—*Mullus vittatus*, Linné: Syst. 1341.—Lacépède, III. Pl. 14, Fig. 1.—*Mullus barbatus*, Bloch-Schneider, 79.—Russell CLVIII. *Bandi Goolivinda*.—*Mullus bandi*, Shaw IV. 615.—*Mullus vittatus*, Shaw IV. 616, Pl. 89.—*Upeneus vittatus*, Cuv. and Val. III. 448.

M. M. Cuvier and Valenciennes count 7 spines in the anterior dorsal; Russell gives 8, and correctly figures the first as being very small. Single small individuals occur at Pinang at all seasons.

2. *With velvety teeth in both jaws; palate toothless.*

HYPENEUS FLAVOLINEATUS,* (Lacépède) VAR.

Head above and back pale bluish brown or bronze; cheeks, sides and abdomen pale greenish silvery; from the lower part of the orbit a vertical crimson streak; opercle and the root of the pectorals crimson; on each side beneath the lateral line a broad longitudinal orange, or rust-coloured band, intersecting the lateral line at the commencement of the posterior dorsal, and terminating above it at the root of the caudal; fins pale yellow; dorsals and caudal each with three or four oblique waved reddish bands; lower part of anal and ventrals pale reddish; gular filaments yellow. Iris golden.

D 7 or 8—9, C $15\frac{4}{5}$, A 7, V $1\frac{1}{5}$, P 14 or 15, Br. IV.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $5\frac{1}{8}$ inch.

M. M. Cuvier and Valenciennes count 7—9 in the dorsal fins; in some individuals however, a very minute spine precedes the longest. Those observed at Pinang appear principally to differ from *H. flavolineatus* in having waved reddish bands on the dorsals and caudal fins. It must however be observed that these bands become totally obliterated shortly after death. The lateral band remains, but it changes to blackish. In other characters this fish agrees with the description of *H. flavolineatus*. The length of the head is contained $4\frac{1}{4}$ times in the total, measured to the centre of the caudal margin; the greatest vertical diameter of the body is $5\frac{1}{3}$ of the total; the eye occupies about the third fourth from the muzzle, its diameter equalling $\frac{1}{4}$ of the length of the head. The distance between the two dorsals equals the extent of the base of the posterior, but is somewhat less than that of the anterior. The ramifications of the lateral line consist of 5 or 6 branches on each scale, of which three or four are directed obliquely upwards, one downwards. The root of the scales has four or five crenulations. The filaments are rather thick, fleshy, slightly exceeding

* *Mullus flavolineatus*, Lacépède III. 406.—*Mullus aureo-riftatus*, Shaw IV. 618.—*Upeneus flavolineatus*, Cuvier and Valenciennes III. 456.

the commissure of the gill-openings. Single individuals occur at all seasons at Pinang.

FAM. CATAPHRACTOIDÆ.

GEN. PLATYCEPHALUS, (*Bloch, Schneider* 1801) *Cuv. and Val.*

Head much depressed with trenchant edges, armed with spines, body covered with scales; ventral fins five-rayed, widely separated from each other, owing to the lengthened and flattened shape of the pelvic bones; palate with sharp teeth; branchiostegous rays 7.

PLATYCEPHALUS INSIDIATOR (Forskål).

Cottus insidiator Forskål, *Fauna Arab*, 25, No. 8.

Cottus insidiator, Linné: *Syst.* 1213.

Callionymus indicus, Linné: *Syst.* 1153.

Cottus spatula, Bloch, *Pl.* 224.

Batrachus indicus, Bloch: 43.

Callionymus indicus, Bloch, 59.

Calliomorus indicus, Lacépède II. 344.

Cotte madécasse, Lacépède, III. 248, *Pl.* 11, *Fig.* 1, 2.

Platycephalus spatula, Bloch-Schneider, 59.

Russell XLVI. Irrwa.

Cottus insidiator, Shaw IV. 260.

Cottus madagascariensis, Shaw IV. 261, *Pl.* 37.

Colliomorus chacca, Buch. *Ham.* 133, 373.

Platycephalus insidiator, Cuvier and Val. IV. 227.

(*Icon*) *Platycephalus chacca*, Gray: *Ill. Ind. Zool.* II. *Pl.* 93, *Fig.* 2.

Platycephalus insidiator, Temm. *Schl. Fauna Japon. Pisc.* 39, *Pl.* XV. *Fig.* 1.

Platycephalus insidiator, Richardson *Rep.* 1845, 216.

Platycephalus insidiator, Bleeker, *Verh. Batav. Gen.* XXII. 6.

Head above and back greenish or brownish grey with a few smaller and larger dark brown scattered spots; sides, from a little below the lateral line, and abdomen white; fin membrane of the caudal white, orange or yellow at the base and along the rays; the base indistinctly spotted with brown; the upper and lower angle black, between both three longitudinal, somewhat oblique black bands, liable to individual variations, the membranes of the other fins whitish, transparent; the dorsal, ventral and pectoral rays more or less distinctly annulated with

brown. Iris pale golden green; pupil black, heart-shaped by a pointed lobe descending from the upper margin of the iris.

D 1—8—1—13, C $15\frac{2}{3}$, A 13, V $1\frac{1}{5}$, P. 18 or 19, Br. VII.

HABIT.—*Sea of Pinang.*

Sea of Madagascar, Red Sea, Moluccas, Seas of China and Japan, Batavia, Bay of Bengal, estuaries of the Ganges.

TOTAL LENGTH: 1 ft. 6 inch.

M. M. Cuvier and Valenciennes count 8 spines in the anterior dorsal fin; at a short distance, however, in front of the first of these eight, is a very small isolated reclining spine, and in the space between the eighth spine, and the first ray of the posterior dorsal, slightly nearer the latter than it is the former, is another very minute isolated reclining spine, which thus make the whole number of spines 10 instead of 8. The first and the tenth spines are so minute, and in the living fish so hid in the scales, that they easily escape notice. Russell, indeed, in Pl. XLVI. correctly gives the tenth spine, and his description counts 9—13 in the dorsal fins.

This as well as the following species of *Platycephalus* is occasionally taken in the fishing stakes placed along the coasts; they are all capable of sustaining life some little time out of water. They are eaten by the natives.

PLATYCEPHALUS CLAVULATUS, Cantor.

(*Young?*)—Head above, opercles, back and sides pale reddish brown; beneath and behind the posterior dorsal fin some large patches of a lighter brown; along the anterior half of the back some distant brown dots; along the lateral line a more regular series of distant brown dots; abdomen and sides, from a little below the lateral line, white; from behind the ventral fins minutely dotted with brown; cheeks whitish, minutely dotted with brown, and with two short vertical brown streaks beneath the orbit; membrane of anterior dorsal minutely dotted with brown; the upper half so closely so, as to acquire a blackish appearance; posterior dorsal whitish, each ray with one or two brown dots at the upper part; caudal membrane whitish, minutely dotted with brown; at the root an indistinct semicircular brown band, near the margin some irregular brown spots, which near the lower part are confluent, forming an oblique band; anal whitish; ventrals and pectorals minutely and so closely dotted with brown, as to have a

blackish appearance; the upper six or seven pectoral rays white, annulated with brown, the 19th and 20th ray, white. Iris pale greenish golden, minutely dotted with brown; pupil heart-shaped.

D 8—11, C. $15\frac{3}{8}$, A 11, V $1\frac{1}{5}$, P 20, Br. VII.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $5\frac{7}{8}$ inch.

The length of the head is contained nearly $3\frac{1}{2}$ times in the total; the eye occupies the second fourth part from the muzzle; the distance between both eyes is less than one half of the vertical diameter of the eye. The nasal bone is rough, but without spines. At the commencement of the supraorbital crest is a reclining spine, on the posterior half three smaller, and on its continuation along the sides of the occiput are two distant spines; from the orbit along the upper margins of the opercles proceed 5 small gradually backwards increasing spines; the opercle has two backwards diverging linear crests without spines. On the middle of the anterior infraorbital bone is a small reclining spine; on the posterior two distant larger, from whence proceeds a raised linear crest, terminating in the upper angular spine of the preopercle. The latter spine extends to the margin of the opercle, its length exceeding three times that of the smaller, lower spine. The angle of the mouth is situated opposite the anterior angle of the orbit. The dentition resembles that of *Platycephalus insidiator*: the upper maxillary velvety teeth form a very narrow band, which is considerably widened on the intermaxillary bones, where the posterior series has on each side three teeth longer than the rest. The lateral line is nearly straight, less approaching the back than in *P. insidiator*; at its commencement, as far as the middle of the anterior dorsal, every other scale has a minute reclining spine; the rest of the lateral line, though raised and distinct, appears to be spineless. The present species of which a single, apparently young, individual was observed at Pinang in 1843, appears to be closely allied to *Platycephalus scaber*, (Linné).

PLATYCEPHALUS CARBUNCULUS, Cuv. and Val.

Platycephalus carbunculus, Cuv. and Val. IX. 461.

Ground colour greenish buff; head, cheeks, back and sides spotted with blackish brown, forming three short vertical bands on the sides of the head beneath the orbit, and three larger irregular bands on the

sides of the body; throat and abdomen white; anterior dorsal fin white, upper half pale blackish, marbled with white veins; posterior dorsal, caudal, ventrals and pectorals white; the rays annulated with pale black; posterior half of caudal pale blackish with two or three waved vertical white lines; anal white, each ray with one or two brown dots near the extremity. Iris pale greenish golden, spotted with brown; pupil black, heart-shaped.

D 9—11 or 12, C $11\frac{3}{5}$, A 12, V $1\frac{1}{5}$, P. 19, Br. VII.

HABIT.—*Sea and estuaries of Pinang.*

Bombay.

TOTAL LENGTH: $6\frac{4}{8}$ inch.

The length of the head is $\frac{1}{3}$ of the distance from the muzzle to the root of the caudal; the latter is $\frac{1}{5}$ of that distance. The breadth of the head in front of the eyes exceeds by $\frac{1}{3}$ the distance from the muzzle to the anterior part of the orbit. The raised supraorbital crest is strongly serrated, leaving the upper part of the skull like a narrow furrow, the breadth of which is scarcely $\frac{1}{4}$ of the vertical diameter of the eye. The upper maxillary teeth form a much broader band than in either *P. insidiator* or *P. clavulatus*, and it is but little widened on the intermaxillary bones, on which the teeth are of uniform length, velvety like the rest. The number of spines of the head renders this species conspicuous. It occurs, although not numerous, at all seasons at Pinang, and it is eaten by the natives.

GEN. SCORPÆNA, (*Artedi*) Linné 1748.

Head large, spinous, filamentous, scaleless, compressed; eyes placed near each other; teeth in the jaws, vomer, and palate; dorsal fin single, anterior part spinous; branchiostegous rays seven.

SCORPÆNA PICTA, Kuhl and Van Hasselt.

Scorpæna picta, Cuv. and Val. IV. 321.

Scorpæna picta, Bleeker: Verh. Batav. Gen. XXII. 4.

Head greenish olive, largely spotted with black, radiating round the orbit; ground colour of body and fins pale greenish or brownish buff, on the back and sides above the lateral line largely and irregularly marbled with black, which beneath the anterior part of the soft dorsal is continued vertically towards the abdomen; the latter and the rest of the sides irregularly spotted with brownish black; spines and fin rays, except the ventral, greenish buff, annulated with brownish black;

membranes of dorsal, caudal and anal fins greenish buff; the spiny part of the dorsal largely washed with black, the rest with a broad vertical blackish spot, continued over the body, and with two smaller at the posterior margin; caudal with a vertical blackish band at the root, a second in the middle, a third at the margin; membrane of pectorals blackish brown; of anal with a black spot behind the root of the second spine, and an irregular blackish transversal band across the middle, with black spots on the margin; ventrals uniformly blackish brown. Filaments of the body black with slate grey points; the two large supraorbital ones olive, largely spotted with black. Iris golden dark olive with five broad radiating black streaks.

D 12/10, C 13 $\frac{3}{3}$, A 3/5, V 1/5, P 17, Br. VII.

HABIT.—*Sea of Pinang.*

Java, Celebes.

TOTAL LENGTH: 7 inch.

The length of the head is a little less than $\frac{1}{3}$ of the total; the eye occupies the second fourth from the muzzle; the angle of the mouth is situated a little in front of the eye, opposite the lowest of the anterior infraorbital spines, which latter is arched downwards, but has its point directed forwards like the two larger ones. Of the three supraorbital spines the central is the strongest: behind it appears a fleshy pointed filament, in length equalling the diameter of the orbit.

Smaller filaments are scattered over the body, and a series appears above the lateral line. The second anal spine is the strongest of all, its length equalling that of the anal fin, which is $\frac{1}{6}$ of the total length. The band of velvety teeth in the upper jaw is narrowed towards the intermaxillary bones. The reverse is the case in the lower jaw, where the band of teeth is considerably widened on the symphysis. The innermost of the lower maxillary teeth are longer than the rest. The present offers the specific characters of *S. picta* in having the lowest of the anterior infraorbital spines directed forwards, and the second anal spine excessively large; but it differs in presenting a long filament above each eye, which did not exist in the specimen described by M. M. Cuvier and Valenciennes. A single individual occurred at Pinang in 1842.

GEN. PTEROÏS, *Cuvier*, 1819.

Differs from *Scorpena* in the absence of palatal teeth, and in having the dorsal spines and pectoral rays excessively elongated.

PTEROÏS MILES, (Bennett.)

Scorpæna miles, Bennett: Ceylon, Pl. 9.

Pteroïis muricata, Cuv. and Val.* IV. 363.

Macrochyrus† miles, Swainson II. 264.

Adult. Ground colour of head and body, impure rose- or flesh-colour, the scales edged with lighter or darker reddish brown, so as to produce a net-work; sides of the head and body with oblique and vertical scarlet bands, the number and breadth varying individually: across the hindhead two or three such, and between the eyes a longitudinal scarlet band; behind the point of the opercle a triangular black spot; lips, throat and abdomen reddish white; dorsal spines scarlet, broadly annulated with black, or white; their membrane scarlet, in some with the pointed portion attached to each spine, black, or with a triangular black spot near the base; dorsal, caudal and anal rays and membranes scarlet; anal spines scarlet, their membrane reddish black; pectoral rays scarlet, more or less annulated with black; base of the pectoral scarlet, continued over the root in the shape of three oblique bands; membrane brownish green or bronze, with a black streak along each ray; ventral spine alternately white and scarlet; membrane pale blackish green, with longitudinal series of black and milky spots between and across the rays; posterior half of the membrane black; a scarlet spot inside the root of each pectoral. Supraorbital fleshy filaments black; those of the upper jaw and preopercle white with scarlet points. Iris silvery white, with four or five scarlet or reddish black radiating bars.

Young. Colours distributed as in the adult; the scarlet paler; pectoral fins uniformly greenish black.

D 13/11, C $14\frac{3}{5}$, A $3\frac{1}{7}$, V $1\frac{1}{5}$, P 12 or 13, Br. VII.

* Although this Vol. bears 1829 on the title-page, the description quotes *S. miles*, Bennett, in *Fishes of Ceylon*, the first edition of which appeared in 1830. However this may be, M. M. Cuvier and Valenciennes in quoting Bennett, admit the priority of his description and figure, and his specific denomination must therefore be retained.

† *Macrochyrus*, Swainson, founded on *Scorpæna miles*, Bennett, is characterised as having "the pectoral fins only one-third as long as the body, and the mouth subvertical." Both characters however, are incorrect; the pectorals in every stage of growth much exceed one-third of the body (total length?), and the mouth opens obliquely as in *Pteroïis*.

HABIT.—*Sea of Pinang.*

Ceylon, Red Sea, Bourbon.

TOTAL LENGTH, $9\frac{3}{8}$ inch.

The length of the head is $\frac{1}{4}$ of the total, equalling that of the caudal fin; the eye occupies the third fourth from the muzzle. Besides the nasal spine, there are two or three supraorbital ones, of which the posterior is the largest; behind it proceeds the spiny temporal ridge obliquely downwards to the commencement of the lateral line, which has one or two spines. On each side of the occiput appears a very broad spine, sharp like a knifeblade, with two points. The ridge of the infraorbital bones is spiny, proceeding obliquely over the cheek towards the margin of the preopercle, from which rise three spines. The surface beneath the infraorbital ridge is uneven to the touch, but without spines. The interval between the orbits is broad, equalling the transversal diameter of the eye. From the central supraorbital spine rises a pointed fleshy filament, which in the young equals one-half of the vertical diameter of the eye; but in the adult it is much shorter, or absent. The most constant of the other filaments is one on the upper jaw near the angle of the mouth, and the largest are two or three on the lower margin of the preopercle. The membrane of the three or four upper pectoral rays has a very deep incision, so as to give each ray a feather-like appearance, and the points of the lowest four or five rays are free, projecting beyond the membrane. The length of the pectoral fin varies not only according to age, but also individually. In a young one the point of this fin reaches to the middle of the caudal, its length being about $\frac{2}{3}$ of the total. In one of two adults of equal length, $9\frac{3}{8}$ inches, the pectoral measures $3\frac{7}{8}$ inches, in the other $4\frac{2}{8}$ inches. In the fish as commonly seen, but a small portion of the base of the dorsal spines is connected by the membrane. In such, however, as have been examined alive, the instant they are taken out of the sea, the membrane is found continued along the posterior margin of each spine till near the point, where an elongated long flap appears, like the pendant of a lance. Out of the element the scarlet colour of the fish soon fades to a deep rose-colour, which then makes the vertical stripes, on which the brown net-work appears, more conspicuous. The fish appears to be a heavy swimmer, and as observed by Bennett, it never attempts to support itself in the air. At Pinang single individuals occur at all

seasons. It is a very bony fish, and the flesh is said to be insipid. It preys on small *Crustacea*.

GEN. PROSOPODASYS,* *Cantor*.

(Equivalent to *APISTUS*, *Cuvier*.)

Differs from *Scorpaena* in having fewer pectoral rays and all branched, a long moveable spine on the infraorbital bone, and a similar one on the preopercle.

PROSOPODASYS TRACHINOIDES, (Cuv. and Val.)

Apistus trachinoides, Cuv. and Val. IV. 401, Pl. 92. Fig. 1.

Trichosomus trachinoides, Swainson, Nat. Hist. Fish. II. 265.†

Apistus trachinoides, Richardson, Rep. 1845, 213.

Apistus trachinoides, Richardson, Voy. Samarang, Fishes, Pl. III.
Fig. 3—5.

Apistus trachinoides, Bleeker, Verh. Bat. Gen. XXII. 8.

Head above and back blackish brown; sides and abdomen pale neutral tint; membrane of the dorsal fin pale bluish grey with four large oblique blackish bands, between which some oblique pale brownish lines; anal and ventrals pale-bluish grey, the former with larger oblique black bands, between which some pale brownish oblique lines; the posterior half of the latter blackish; caudal yellowish white, minutely dotted with brown and with a black vertical band at the root, and one or two vertical series of black spots near the posterior margin; pectorals pale neutral tint largely spotted with blackish brown. Iris golden flesh-colour, minutely dotted with black.

D 14 or 15/5, C 12 $\frac{3}{3}$, A 3/4, V 1/5, P 12, 13 or 14, Br. VI.

HABIT.—*Sea and estuaries of Pinang, Singapore.*

Java, Madura, Sea of China.

TOTAL LENGTH, 3 $\frac{1}{8}$ inch.

The fish is numerous at all seasons. It is capable of living a considerable time out of its element. It is applied as manure, but not eaten.

* *Πρόσωπον*, mask; *δασὺς*, rough. Substituted for *Apistus* Cuvier, 1829, preoccupied by *Apistis* (Scr. *Apistus*,) Hübner 1816 (*Lepidopt.*)

† *Trichosomus*, in itself inadmissible, is not equivalent to *Apistus*, Cuv.

GEN. CORYTHOBATUS,* Cantor.

(Equivalent to MINOUS. Cuv. and Val.)

Differs principally from *Prosopodasys* (*Apistus*,) by the absence of scales, and of teeth on the palatal bones.†

CORYTHOBATUS WOORA, (Cuv. and Val.)

Russell CLX. Worrak Minoo A.

Apistus minous, Cuv. R. A. II. 168^(3.)

Minous woora, Cuv. and Val. IV. 421.

Apistes russellii, Swainson, II. 265.

Minous woora, Richardson, Rep. 1845, 213.

Head above and back brownish grey, or pale silvery grey; sides and abdomen buff or bluish white; dorsal fin buff, the margin of the spiny portion, and the upper half of the soft portion black; caudal pale yellowish white, with a vertical blackish band at the root; a second in the middle, and a third near the margin; anal and ventrals buff, their external half black; pectorals buff at the root, the rest black; the free ray white, more or less distinctly annulated with black; body and fins minutely dotted with black; filaments of lower jaw white. Iris silvery grey, minutely dotted with black.

D 9 or 10/10 or 11, C 11 $\frac{2}{3}$, A 1/9, V 1/5, P 10 or 11—1, Br. VII.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula.*

Isle of France, China Seas, Vizagapatam.

TOTAL LENGTH, 3 $\frac{6}{8}$ inch.

M. M. Cuvier and Valenciennes count 11/12 in the dorsal, Sir J. Richardson 10/11. (China Spec.) At Pinang the species is numerous, and applied as manure.

CORYTHOBATUS ECHINATUS, Cantor.

Plate XIII.

Ground colour of head and body umber, pale on the sides and abdomen; fins of a darker brown than the body; on the opercles, above the lateral line and close to the anal fin some larger and smaller irregular light spots, edged with black; numerous similar small round

* *Kópus* helmet; *βάρτος* thorny. Substituted for *Minous*, Cuvier and Valenciennes 1829, pre-occupied by *Minois*, Hübner 1816 (*Lepidopt.*)

† *Minous woora*, and *M. monodactylus*, the two only species described by Cuvier and Valenciennes, and *M. adamsii*, Richardson: Voy. Samar. Fishes, 7, Pl. II. Fig. 4—5, have a free undivided ray beneath the pectoral fins, but *Corythobatus echinatus* has no such free ray.

spots on the fins ; on the caudal three large such bordering the margin ; from the root of the pectoral to the gill-opening two rose-coloured irregular bands edged with black ; a similar angular spot behind the eye, and some similar bars radiating over the iris ; the latter with a narrow golden circle round the pupil.

D 13/11, C 11 $\frac{2}{2}$, A 2/8, V 1/5, P 11, Br. VI.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH, 3 $\frac{7}{8}$ inch.

The form of the body is broad lanceolate, with the sides highly compressed. The profile of the forehead ascends nearly vertically, from thence the back forms an arch ascending to the sixth dorsal spine, when it gradually descends towards the tail ; the profile of the abdomen is a little less arched than the back. The length of the head is 3 $\frac{2}{3}$ of the total. The eye is placed high on the head ; the vertical diameter of the orbit, slightly exceeding the horizontal, is $\frac{1}{4}$ of the length of the head ; the distance of the orbit from the back, or the root of the anterior dorsal spine is $\frac{1}{2}$ of the diameter of the orbit. The anterior, moveable, infraorbital bone carries two blunt spines of which the superior, the longer, scarcely projects beyond the middle of the orbit : both are directed backwards and downwards. The posterior infraorbital is immoveable, and has but two very minute spines. The rounded preopercle carries four distant, flattened spines : the two lower ones are very minute, the two upper hardly extend beyond the anterior third of the opercle. The opercle terminates above in a flat membranous point, below which appear two oblique long ridges. There appears to be but a single nasal opening which is a small tube, situated in front of the lower part of the eye. The small oblique mouth scarcely reaches the level of the anterior orbital margin. The velvety teeth (Pl. XIII. Fig. 2,) are placed in both jaws on a crescent-shaped band ; that of the upper is divided under the symphysis by a naked linear interval, behind which appears a minute fleshy tubercle. On the vomer appears a small crescent of velvety teeth. But the palatals are toothless. The tongue resembles that organ of *Prosopodasys trachinoides* and *Corythobatus woora* : it is moveable, fleshy, rounded, and occupies nearly the whole cavity. The greatest vertical diameter, at the root of the pectoral, equals the length of the head, the greatest thickness is 2 $\frac{1}{2}$ of the former diameter. The dorsal

fin occupies the whole length of the back. The anterior spine rises between the anterior orbital margins: it is the longest and strongest of all, its length being about $\frac{3}{4}$ of that of the head. The succeeding spines and rays gradually decrease to the seventh ray, which is about $\frac{3}{4}$ of the length of the head. The remaining rays abruptly decrease; the eleventh, being but $\frac{1}{2}$ of the length of the head, is attached to the tail by a continuation of the dorsal membrane. All the finrays are undivided, but jointed. The caudal is subrhomboidal or rounded, the longest, central, rays are a little shorter than the head. The extent of the anal fin slightly exceeds $\frac{1}{3}$ of the dorsal; the two spines and the seventh and eighth ray are a little shorter than the intervening rays, which are $\frac{1}{2}$ of the length of the head. The lower half of the eighth anal ray is attached to the tail by a very short continuation of the finmembrane. The anus is situated a little in front of the fin. The pectorals are elongated, rhomboidal, the central rays equalling the length of the head. The anterior ventral ray, the longest, slightly exceeds $\frac{1}{2}$ of the length of the head; the fifth is attached to the abdomen by a continuation of the finmembrane. The lateral line is a series of linear tubes, nearly following the outline of the back on the upper third of the side. The fish appears to be without scales, but it is studded with small tubercles, each surmounted by a minute, backward directed spine. The tubercles may be seen by the naked eye, but their spines may be perceived by passing a finger from the tail forward. On the back, the sides of the head and body the tubercles are fewer, more distant than on the throat and abdomen, where they are crowded. The axilla and the space covered by the pectorals is naked.

A solitary individual occurred at Pinang in July 1842.

GEN SYNANCIA, *Bloch Schneider* 1801.

Differs from *Pelor* by the want of teeth on the palate and vomer, and of free rays beneath the pectoral fins.

SYNANCIA ELONGATA, *Cuv. and Val.*

Synancia elongata, *Cuv. and Val.* IV. 456.

Trachicephalus elongatus, *Swainson* II. 268.

Synancia elongata, *Bleeker*: *Verh. Batav. Gen.* XXII. 10.

Head, back and sides bluish brown or neutral tint, paler on the abdomen and with rose coloured lustre, everywhere minutely dotted with black, and with scattered round white spots, and white warty filaments;

dorsal, caudal, anal and pectoral fins neutral tint, largely marbled with black, and with numerous white spots; ventrals neutral tint, posterior half black; points of all the rays white. Iris pale golden, dotted with black and with radiating black bars.

D 10 or 11/14 or 15, C $12\frac{1}{2}$, A 2/13 or 14, V $1\frac{1}{5}$, P 14 or 15, Br VII.

HABIT.—*Sea of Pinang.*

Java, Pondicherry.

TOTAL LENGTH: $4\frac{3}{8}$ inch.

M. M. Cuvier and Valenciennes count 9/15 in the dorsal fin. The length of the head is about $\frac{1}{5}$ of the total; the eye occupies the second fourth from the muzzle. On the lateral line appears a series of distant filaments, of which the anterior four are long, the rest fleshy, all with the apex divided in two. The anterior half of the line proceeds from the angle of the opercle obliquely upwards, the posterior half follows the back till the root of the caudal, where it bends obliquely downwards to the centre of the fin, terminating horizontally near the margin. This species is numerous at Pinang where, if used at all, it is with other offal applied as manure. It is capable of living a considerable time out of water.

FAM. SPAROIDÆ.

GEN. CHRYSOPHRYS, *Cuvier*, 1829.

Rounded molars on the sides of the jaws, disposed in the upper jaw in at least three series; in front some conical or blunt teeth; branchiostegous rays six.

CHRYSOPHRYS CALAMARA, *Cuv. and Val.*

Russell XCII. Calamara.

Chrysophrys calamara, *Cuv. and Val.* VI. 117.

Head above blackish brown, the rest of the body silvery grey, the scales minutely dotted and edged with brown; spines, rays and fin membranes grey, minutely dotted with brown, which gives the anal and ventral membranes a blackish brown appearance. Iris silvery, minutely dotted with brown, the upper margin black.

D 11/10 or 11, C $19\frac{2}{3}$, A 3/9, V $1\frac{1}{5}$ P 15, Br. VI.

HABIT.—*Sea of Pinang.*

Java, Madras, Vizagapatam, Malabar.

TOTAL LENGTH: 10 inch.

When the upper jaw is protracted the length of the head is $\frac{1}{3}$ of that of the body, the caudal fin not included; the eye borders on the profile, and occupies the centre between the protracted muzzle and the membranous point of the opercle; its diameter is little less than $\frac{1}{3}$ of the length of the head. The second anal spine is the largest of all, its length equalling the distance from the protracted muzzle to the posterior margin of the orbit. The ventral spine equals the length of the fourth dorsal; the first soft ray terminates in a short filament. The pectoral fins when at rest, are slightly falcated, the fifth ray, the longest, reaching to the second anal spine.

At Pinang this fish appears to be an occasional visitor, a few individuals occurring together at irregular intervals, and they rarely exceed 7 inches in length. The flavour is said to be good.

GEN. PENTAPODUS, Cuvier, 1829.

With three elongated pointed scales, of which one above the root of each ventral, and a single between these fins, appearing like five ventrals, or feet; mouth little cleft; body rounded, with rather hard scales, advancing farther in front than in *Dentex*. In each jaw two canines, between which sometimes two or four smaller; the rest of the teeth velvety, disposed in narrow bands.

PENTAPODUS NUBILUS, Cantor.

Head above and back light reddish brown, paler on the sides; cheeks gill-covers and abdomen silvery white; an indistinct blackish oblique band from the nape of the neck to the point of the opercle; a second similar in front of the dorsal, terminating beneath the lateral line in a large rounded spot; a few indistinct blackish clouded spots along the sides; the scales of the body indistinctly edged with brownish and minutely dotted with brown; dorsal caudal and anal pale yellowish; pectorals and ventrals white, the posterior half of the latter pale blackish; the fin-membranes minutely dotted with brown. Iris pale golden. A number of minute pores on the infraorbital bones, the cheeks, the margin of the preopercle and on the lower jaw.

D 10/9, C 17 $\frac{1}{7}$, A 3/8, V 1/5, P 13, Br. VI.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH, 4 $\frac{2}{8}$ inch.

The head is elongated, the profile much sloping, its length, when the muzzle is protracted, is $\frac{1}{3}$ of that of the body, the tail not included.

The eye is situated behind the centre of a line drawn from the protracted muzzle to the point of the opercle; its diameter is a little less than $\frac{1}{3}$ of the length of the head. The canines of both jaws are very small; there are 4 in the upper, 6 in the lower of which the two outer ones are the largest and slightly outwards arched. The pores are very minute, scarcely perceptible by the naked eye, rather closely distributed over the infraorbitals, the cheeks, the margin of the preopercle and the lower jaw. The lateral line is very distinct, following the outline of the back. The scales are very finely ciliated: there are about 47 on a straight line. This species is closely allied to *P. porosus*, Cuv. and Val. from which it differs in the eye being situated farther back, in the comparatively longer pectoral fins, the second and third upper rays reaching the anal spine, and in the comparative greater length of the anal spines. The anterior of the latter is half the length of the second and third, which are equal and of nearly the same length as the succeeding soft rays. The description is taken from a solitary individual, observed at Pinang in 1844.

GEN. SPONDYLIOSOMA,* *Cantor.*

(Equivalent to *CANTHARUS*, *Cuvier.*)

Teeth card-like, close, the external series a little stronger than the rest and slightly curved; mouth slightly cleft, not protractile.

SPONDYLIOSOMA GULIMINDA, (Cuv. and Val.)

Russell CVII. Lama Guliminda.

Cantharus guliminda, Cuv. and Val. VI. 344.

Young.—Head above, back and sides above the lateral line rose-coloured; the latter bordered beneath by a pale blue line; sides and abdomen silvery with five parallel straight longitudinal lines, each rose-coloured, bordered beneath with pale blue; cheeks and opercles silvery, washed with rose colour; beneath the orbit an elongated blue spot; a larger one on the opercle. Dorsal fin whitish transparent, either pale blue at the base, or with a bluish line behind each spine; the spiny part edged with vermilion; anterior half of caudal bluish, posterior pale crimson; the other fins whitish transparent; the anal membrane in some bluish near the margin.

* Σπονδύλιον spindle; σῶμα, body. Substituted for *Cantharus*, Cuvier, 1829, pre-occupied by *Cantharus*, Montfort, 1808, (*Polypi.*)

Adult.—Head above and back vermilion; ground-colour of the upper half of the sides greenish grey, of the lower and of abdomen silvery; from the occiput a golden longitudinal band bordering the back; the lateral line bordered above by a crimson, beneath by a golden band; the scales at the origin of the lateral line broadly edged with crimson, forming a large rounded spot, from which proceeds a straight longitudinal crimson band, bordered beneath by a narrower golden band, beneath which four similar parallel bands, gradually lengthening and becoming paler towards abdomen. Infraorbitals silvery crimson, cheeks and opercle silvery, posterior half of opercle crimson; preopercle violet silvery; caudal rose-coloured; the other fins transparent white; dorsal edged with vermilion. Iris golden, upper margin bluish black.

D 10/9, C $17\frac{2}{5}$, A $3/7$, V $1/5$, P 17, Br. V.

HABIT.—*Sea of Pinang.*

Madras, Vizagapatam.

TOTAL LENGTH: 6 inch.

The head is $\frac{1}{4}$ of the total length to the centre of the posterior margin of the caudal; the greatest vertical diameter of the body equals the length of the head; the horizontal diameter of the eye is $\frac{1}{3}$ of the latter; the eye occupies the second third. The ascending margin of the preopercle is finely toothed, the angle rounded; on its outer surface as well as on the infraorbitals appear some distant minute pores. The upper lobe of the caudal is longer than the lower, and the third upper ray terminates in a not very long filament, which is also the case with the first ventral ray.

The following errors occur in Russell's figure. The first dorsal spine is too short, its length in the fish is $\frac{3}{4}$ of the second. The pectoral is also too short, its length being equal to that of the head; the dorsal rays likewise: their length slightly exceeds that of the spines. The anal fin is erroneously represented with one spine: it has three, the first of which is $\frac{1}{2}$ of the second, which is but little shorter than the third. The ventral spine is one half the length of the head and equals the 10th dorsal, which slightly exceeds the preceding. All the spines are very slender and flexible. Single, mostly young individuals occur, but rarely, at Pinang.

GEN. CRENIDENS, *Cuvier and Valenciennes*, 1830.

The jaws with crenulated teeth, behind which others globular.

SUB. GEN. GIRELLA,* (Gray,) Richardson.

Teeth curved, flat and expanding towards their ends which are tricuspid, standing out in three rows on the margin of the jaw; a little way behind them a brush-like band of much smaller teeth which are also tricuspid and like the others, except in size.

CRENIDENS SARISSOPHORUS, Cantor.

Pl. I. Figs. 1-4.

Young.—Head, back and sides above the lateral line pale umber brown; rest of the sides and abdomen silvery buff; all the scales broadly edged with pale umber; spines buff, minutely dotted with dark brown; fin-membranes and rays buff, so closely dotted with dark brown, as to appear a shade darker than the body. Iris pale golden, orbital margin blackish.

D 11/15, C 15 $\frac{7}{7}$, A 3/14, V 1/5, P 19, Br. V.HABIT.—*Sea of Pinang, Malayan Peninsula.*TOTAL LENGTH: 7 $\frac{6}{8}$ inch.

The form is elongated oval; the abdominal profile a little less arched than the dorsal. The vertical diameter at occiput is $\frac{1}{4}$, at the fifth dorsal spine $2\frac{3}{4}$, between the last dorsal and anal rays $\frac{1}{8}$ of the total length. The body is much compressed, particularly towards the back; the greatest thickness is at the lower third of the vertical diameter, where it equals $\frac{1}{2}$ the length of the head. The muzzle is obtuse; the forehead a little arched between the eyes; the length of the head is $\frac{1}{4}$ of the total; the eye is placed high up, its horizontal diameter is about $3\frac{1}{2}$ of the length of the head; the distance from the muzzle equals the diameter. The posterior opening of the nostril is an almost vertical fissure immediately in front of the eye; the anterior is oval and situated a little behind the muzzle; the infraorbital bone is very large, occupying nearly the upper half of the cheek, it is tumid and of an elongated, nearly oval shape; the preopercle is narrow and obscurely ridged, with a single minute spine at the angle; the opercle terminates in two widely separated flat points; the subopercle and interopercle are small. The scales of the head are very small, those of the cheek less indistinct than on the other parts of the head. The mouth is

* Founded upon *Crenidens punctatus*, Richardson, (Report 1845, 242,) of which a figure appears in *Ill. Ind. Zool.* under the name of *Girella punctata*.

small, both jaws of equal length; their teeth are curved, flat, widening towards the three cusps, of which the centre one is a little larger than the lateral ones; the outer series consists of about 18 teeth gradually increasing in length towards the angle of the mouth (Fig. 2;) immediately behind, and in close contact with the outer, appears a second series of similar teeth; at a little distance behind these two series are two others also consisting of tricuspid teeth, but much smaller and almost setaceous (Fig. 3;) at the angle of the mouth the teeth of all four series coalesce, and have no interval between them. The gill-opening is small linear, and the five branchiostegous rays are completely hid in the membrane; the suprascapular bone is naked. The body is covered with scales of different sizes; the largest are those of the sides, from immediately beneath the lateral line as far as the pectorals extend, they appear bony and tumid; the posterior rounded margin carries upwards of 40 minute spines; their vertical diameter, nearly double the length of the horizontal, is about $\frac{1}{2}$ of the diameter of the eye. From the apex of the pectorals the scales gradually decrease in size towards the caudal. The scales above the lateral line and those of the abdomen are much smaller than the rest; all are placed in irregular series, so that their number cannot be counted. The lateral line is a little below the upper fourth of the side; it consists of minute single tubes and follows the profile of the back towards the tail, in the middle of which it proceeds straight to the root of the caudal. The anterior dorsal spine, about $\frac{1}{2}$ of the diameter of the eye, is situated at the anterior third of the total length; it is immovable, placed horizontally, has no membrane and becomes more or less hidden by age; the second spine is the shortest of all, about $\frac{1}{4}$ of the diameter of the eye; the third is $\frac{3}{4}$, the fourth exceeds by $\frac{1}{4}$ the diameter of the eye; the fifth is excessively long, robust and appears to be composed of two parts; the lower half, when reposing, covers with its grooved posterior margin the sixth spine; the upper half overlaps the succeeding five spines; the length of the fifth is $\frac{3}{4}$ of the greatest vertical diameter of the body, from the root of this spine. The rest of the spines gradually decrease in length towards the tenth, which equals the diameter of the eye; the eleventh exceeds it by $\frac{1}{4}$ and is closely attached to the anterior dorsal ray. The first four dorsal rays are the longest, of equal length, $\frac{2}{5}$ of the head; the rest gradually decrease, the fifteenth,

double one, being $\frac{1}{3}$ of the first. The caudal is almost truncated, the central rays being but a little shorter than the rest, which are $\frac{2}{3}$ of the length of the head. The anal rays resemble the dorsal; the spines are strong, the second, the longest, about $2\frac{1}{2}$ of the head. The anus is situated a little in front of the first spine. The pectoral is nearly triangular, the longest ray $\frac{3}{4}$ of the head. Each ventral is enclosed by two elongated scales; the spine is $\frac{1}{2}$ of the length of the head; the anterior ray is undivided, filamentous, its length equals that of the head; from the second, which slightly exceeds the spine, the rest gradually decrease. The individual described was observed at Pinang in August 1845. The fishermen declared it to be a young one, and of rare occurrence. A second, of somewhat larger size, was taken on the coast of Malacca.

(SUB-FAM. MÆNOINÆ.)

CÆSIO,* (*Commerson*) *Cuv. and Val.* 1830.

Dorsal and anal fin covered with small slender scales; mouth very slightly protractile; no teeth on the vomer; a pointed scale above the root of each ventral, and a third between the fins; on the occiput a chevron or crescent with the horns backwards pointed.

CÆSIO CÆRULAUREUS,† *Lacépède.* VAR.

Head above and back deep blue, changing to bluish olive on the sides; an indistinct golden line from the orbit along the sides, in the centre of which it changes to silvery blue, continued to the root of the caudal; opercle golden; cheeks, preopercle, subopercle and interopercle, lower half of the sides and abdomen silvery glazed with cherry red; dorsal pale olive grey, the membrane minutely and closely dotted with brown and edged with black; caudal membrane black, rays yellowish olive, the upper, lower and posterior margin cherry; ventrals and the spiny part of anal white, the membrane of the soft anal rays pale cherry; the three upper rays of the pectoral white, the rest pale cherry; on the inner side at the root a large black spot, continued as a small black point outside at the root of the three upper rays. Iris golden, the orbital margin blackish.

D 10/15, C $17\frac{5}{5}$, A 3/12, V 1/5, P 21, Br. VI.

* *Cæσιο*, *Lacépède*, 1800, is founded upon erroneous characters.

† *Lacép.* III. 86.—*Picarel raillard*, *Quoi and Gaim.* *Freycin*, 290, Pl. 44, fig. 3.—*Cuv. Val.* VI. 434.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: $6\frac{2}{8}$ inch.

The scales are large, deciduous; there is no crescent-shaped space on the occiput, which is uniformly covered with scales, which advance on the crown as far as midway between the eyes. The present nearest approaches the Variety from the Red Sea, which Prof. Ehrenberg denominated *cæruleo-tæniatus*; it also resembles *C. chrysozona*, Kuhl and Van Hasselt, apud Cuvier and Valenciennes. As the distribution of colours of *C. cæruleus* is liable to considerable variations, *chrysozona* may turn out to be but a Variety. The description of the present was drawn up from a single dead specimen, observed in the fish-bazar at Pinang in 1845. The fishermen were unacquainted with the fish, and had on that account put it aside.

GEN. CATOCHAENUM,* *Cantor.*

(Equivalent to GERRES, *Cuvier.*)

Mouth very protractile downwards; the jaws with velvety teeth; the angle and inferior margin of the preopercle minutely toothed in some, in others not; opercle terminating in an obtuse angle; body compressed, high; chest square beneath; head, cheeks and opercles like the body with large, deciduous scales; anterior dorsal and anal spines more elongated than the rest; the base of these fins is hid in a scaly sheath; the ventral fins with an elongated scale above the root.

CATOCHAENUM LIMBATUS, (Cuv. and Val.)

Gerres limbatus, Cuv. and Val. VI. 476.

Silvery with lilac reflections; dorsal, caudal and anal fins pale yellow; dorsal spines, rays and membrane minutely dotted with brown, the upper margin black, caudal with a broad blackish margin; ventrals and pectorals white. Iris silvery or pale golden.

D $9/10$, C $17\frac{5}{8}$, A $3/7$ or 8, V $1/5$, P 15 or 16, Br. VI.

HABIT.—*Sea of Pinang.*

Malabar, Pondicherry.

TOTAL LENGTH: 7 inch.

The greatest vertical diameter is contained three times and one-third in the total length. The length of the second dorsal spine is contained two and a half times in the vertical diameter. In the adult this spine

* Κάτω, downwards; χάλυων, yawning. Substituted for *Gerres*, Cuvier, 1829, pre-occupied by *Gerres*, (Latr.) Fabricius, 1794, (*Hemiptera*.)

slightly exceeds the third in length, but in the young the two spines are of equal length, and the lower margin of the preopercle is finely toothed, of which all trace is obliterated in the adult. The blackish margin of the caudal is very indistinct in the young, which bears a strong resemblance to *Catochaenum lucidum*, (Cuv. and Val.)

Young individuals of this species are exceedingly numerous at Pinang at all seasons, and large quantities are dried. Large individuals are of comparatively rare occurrence.

CATOAENUM FILAMENTOSUM, (Cuv. and Val.)

Russell LXVII. Woodawahah.

Gerres filamentosus, Cuv. and Val. VI. 482.

Gerres filamentosus, Bleeker : Verh. Bat. Gen. XXII., 4.

Head above and back pale greenish grey, the rest of the body silvery with lilac reflections ; above and following the lateral line two parallel series of large oval blackish spots ; below the lateral line one or two straight series of similar, but smaller spots ; dorsal, caudal and anal fins pale yellow ; the spines, rays and membranes of the dorsal and caudal minutely dotted with brown ; the superior margin of the dorsal black ; the posterior margin of the caudal pale blackish ; ventrals and pectorals white. Iris pale golden.

D 9/10, C $17\frac{5}{8}$, A $3\frac{7}{8}$, V $1\frac{1}{5}$, P 15, Br. VI.

HABIT.—*Sea of Pinang.*

Madura, Vanikolo, New Guinea, Java, Coromandel.

TOTAL LENGTH : $7\frac{4}{8}$ inch.

The length of the second dorsal spine appears to vary : in an adult and a few young, it but slightly exceeded the vertical diameter of the body, and did not reach the caudal fin, as described by M. M. Cuvier and Valenciennes. The young ones have no series of blackish spots, which vanish soon after death ; in the smallest examined, $4\frac{4}{8}$ inches in length, the margin of the preopercle was not toothed. This species but rarely visits Pinang.

FAM. SCIÆNOIDÆ.

SUB—GEN. OTOLITHUS, *Cuvier* 1829.

Head gibbous, supported by cavernous bones ; preopercle toothed or crenulate ; bony opercle terminating in one or two flat points ; dorsal fins two, or one deeply emarginated, the soft part of which longer than

the spinous; anal spines extremely small; strong canines in the upper jaw, and in some also in the lower; under the symphysis of the latter two very minute pores, or none; air-vessel in some* with a hornlike forwards directed process on each side; † a very large loose bone in each auricular cavity; branchiostegous rays 7. ‡

OTOLITHUS BIAURITUS, Cantor.

Ikan Salámpai, sometimes Járang gígi, of the Malays.

Adult. Head above and back greenish grey with golden reflections; sides golden orange, paler towards abdomen, everywhere minutely dotted with brown; lateral line golden; dorsal, caudal and anal fins brownish yellow or pale orange, minutely dotted with brown, black towards the margin; ventrals pale orange; pectorals brownish with a black spot in axilla, spreading over the basal third of the nine upper rays. Iris golden orange.

Young. Paler than the adult; abdomen silvery buff; upper half of opercle silvery bluish black; the spot in the axilla very indistinct or absent.

$$D. \left\{ \begin{array}{l} 9-1/27, \\ 9-1/30, \\ 9-1/32, \\ 8-1/32, \end{array} \right\} C 17\frac{5}{8}, A 2/7, V 1/5, P 19, Br. VII.$$

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore, Lancang, Tenasserim Provinces.*

TOTAL LENGTH: 3 feet.

This fish is of a very elongated cylindrical form, not unlike that of the Genus *Ophiocephalus*; the profile of the back and abdomen is nearly horizontal, imperceptibly sloping towards the bluntly pointed muzzle. The length of the head is from $4\frac{1}{2}$ to $\frac{1}{3}$ of the total; the depth at occiput exceeds by $\frac{1}{3}$ half the length of the head. The eye occupies about the second eighth of the length of the head; the anterior upper half of the orbit borders upon the profile, while the posterior half deviates downwards; the greatest oblique diameter is $\frac{1}{3}$ of the length

* M. M. Cuvier and Valenciennes add (*Hist. Nat. des Poiss.* V.) that such is the case in the species dissected by them.

† In others with numerous lateral branched appendages; Vide infra *Otolithus ruber* and the subsequent species.

‡ The Malays distinguish the fishes belonging to the Genus *Otolithus* by the common denomination of *Járang* (distant, open), *gígi* (tooth).

of the head, while the vertical is but $\frac{2}{3}$ of the oblique diameter. The head above is depressed, slightly arched between the eyes, the distance of which is about double the oblique diameter. The nostrils open closely in front of the eye: the posterior obliquely oval aperture is but little larger than the minute rounded anterior, the margin of which is provided with a small raised membranous fold. The mouth is large; the widely arched upper jaw is hidden when the mouth is closed, by the scaly fold which covers the infraorbitals; the lower jaw is scaly, narrower, more pointed, and slightly shorter than the upper, which is naked, with longitudinal striæ, and a rather large triangular impression near the angle, which is situated opposite the posterior part of the orbit. In the upper jaw appear an external series of pointed inwards arched, distant teeth. On each side of the symphysis is one or two canines, larger than the rest; the other teeth gradually decrease in size towards the angle of the mouth. At a slight interval behind the external appears a second narrow series of minute crowded conical (card-like) teeth. In the lower jaw the external series consists of conical teeth, although small, yet perceptibly larger than the card-like ones of the upper jaw. The internal series consists of single distant large teeth, increasing in size as they approach the angle of the mouth. The tongue is large triangular, pointed, fleshy on each side of the base, flat, bony in the centre, membranous towards the margins and the apex. The angle of the preopercle is rounded, the ascending margin is but very indistinctly crenulated. The bony part of the opercle terminates in two flat points of which the upper is the smaller; both are enveloped in a membranous point, projecting beyond the root the pectoral fin, and formed by a prolongation of the subopercle. The third upper branchiostegous ray is very broad, like the blade of a sabre. Above the pointed termination of the opercle appears another, triangular point, formed by a lobe of the skin, the scales of the margins of which terminate in short setaceous points. This second, earlike appendage also appears in *Otolithus pama*,* (Buchan. Ham.) The body is elongated cylindrical, compressed towards the back; the vertical dia-

* SYN. *Bola pama*, Buchan. Ham. 79, 368, Pl. 32, Fig. 26.—*Sciæna pama*, Cuv. and Val. V. 55, Pl. 101, who observe it might with equal propriety be considered a species of *Otolithus*. Their description appears to have been drawn up

meter taken in front of the dorsal fin is $6\frac{1}{3}$ of the total length. The dorsal spines are very slender; the third is the longest, equalling about $\frac{1}{2}$ of the vertical diameter; the rest gradually decrease towards the ninth, but the last spine is longer, nearly $\frac{1}{2}$ of the third. The caudal fin is rhomboidal very pointed, its length from $6\frac{1}{2}$ to $7\frac{1}{2}$ of the total. The pectorals are very pointed $5\frac{2}{3}$ to $6\frac{1}{2}$ of the total. The ventrals and the anal are equal $\frac{1}{2}$ of the length of the head. The second anal spine is scarcely one half of the length of the rays, very attenuated, and not striated. The scales of the body are moderate, deciduous; the lateral line is very distinct and proceeds obliquely downwards to the very point of the caudal. The air-vessel is nearly one half of the total length, narrow, tapering backwards to a fine point. On each side of the latter commences a narrow tape-like process, which continuing along each side, deviates at a little distance from the fundus of the air-vessel, which it again joins. The organ might be compared with an elongated antique urn with two handles. From the anterior part of each of the latter proceed five branches, the four of which give off smaller ones to each side, and the fifth is tortuous and larger than the rest. This organ strongly resembles that of *O. pama*, (Cuv. and Val. V. Pl. 138,) yet it presents differences more easily perceived by comparison than described.

This species approaches to *O. senegalensis*, Cuv. and Val. and to *O. pama*, from which latter it, however, differs in its more elongated form, particularly of the head, and in having much fewer rays in the dorsal fin. *O. reevesii*, Richardson, (Rep. 1845, 224,) differs in having 10—1/31 in the dorsal fin, the preopercle spinously toothed on the upper limb and rounded corner, where the teeth are large, and in having the second anal spine stout and finely striated. Single individuals occur at Pinang at all seasons, but numbers from June to August. Although not much esteemed by Europeans, this fish is consumed by the natives both fresh and dried. It yields a large quantity of isinglass, which in the Chinese market is considered to be of the best quality, and fetches 40 to 45 Spanish Dollars per Pikul.

OTOLITHUS RUBER, (Bloch-Schneider.)

Johnius ruber, Bloch-Schn. 75, No. 3, Pl. 17.

from young specimens, in which the canines are less developed than in the adult, in which they appear as strong and conspicuous as in several species of *Otolithus*. The form of the airvessel is not exclusively characteristic of *pama*.

Otolithus ruber, Cuv. and Val. V. 60, Pl. 102.

Otolithus ruber, Swainson, Nat. Hist. Fish. II. 219.

Jarang gigi of the Malays.

Adult. Head above and back pale brownish red with silvery, iridescent reflections; sides of the head and parts beneath the lateral line reddish or pure shining silvery; upper part of opercle steel-blue; lateral line silvery; dorsal pale brownish red, the membrane minutely dotted with brown; the other fins pale reddish yellow. Iris reddish golden, brown towards the orbit.

Young. Sides of the head and parts beneath the lateral line silvery pale orange.

D 10—1/29 or 30, C 17 $\frac{5}{5}$, A 2/7, V 1/5, P 16, Br. VII.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singa-*
Coromandel, Malabar. [pore.

TOTAL LENGTH: 2 feet 6 inch.

The length of the head is 3 $\frac{1}{2}$ times in the total; its vertical diameter equals the distance from the muzzle to the anterior margin of the preopercle, or exceeds by $\frac{1}{6}$ half the length of the head. The greatest oblique diameter of the eye is $\frac{1}{6}$ of the length of the head. The depth of the body in front of the dorsal is contained 4 $\frac{3}{4}$ times in the total length. In the young the caudal fin is rhomboidal, pointed; but with age it becomes rounded, and its length little less than $\frac{1}{6}$ of the total. On each side of the symphysis of the upper jaw appear two large arched canines, of which the exterior is the shorter; between the two pairs rise two distant smaller, yet conspicuous teeth. On each side of the symphysis of the lower jaw appears a long canine; in most individuals but one such is visible, the corresponding one being either missing or much smaller. Behind the canines both jaws have an external series of small conical teeth, and in the upper appears an inner series of velvety. But the lower jaw has but a few such behind the canines on the symphysis. The stomach is elongated, cylindrical with four cœcopyloric appendages. In several it contained remains of fishes, of a small *Melania* and *Crustacea*. The air-vessel is large, flattened, broad lanceolate, terminating behind in a short point. Its length is $\frac{1}{2}$ of the body, the caudal not included. On each side of the body of the vessel appear 34 processes, of which the anterior four or five divide in four branches, the next in three, the next in two, but the posterior processes, which are slightly

longer than the preceding, are simple; all again divide in minor ramifications. The isinglass is considered very good, and sells in the Chinese market from 40 to 45 Spanish Dollars per Pikul. The fish is consumed both in fresh and dried state. Single individuals occur at Pinang at all seasons, but they are plentiful from June till August.

OTOLITHUS ARGENTEUS, Kuhl and Van Hasselt.

Otolithus argenteus, Cuv. and Val. V. 62.

Otolithus argenteus, Richardson, Rep. 1845, 225.

Otolithus argenteus, Bleeker: Verh. Bat. Gen. XXII, 4.

Jarang gigi of the Malays.

Adult. Head above and back iridescent greyish green, with pale reddish reflections; sides of the head and beneath the lateral line reddish golden; upper part and posterior margin of opercle blackish blue; membrane of the whitish dorsal spines reddish transparent, of the rays and caudal reddish yellow, minutely dotted with brown, margin black; pectoral, ventrals and anal pale yellowish red; ventral and anal spines whitish. Iris golden, bluish black towards the orbit.

Young. Sides of the head and beneath the lateral line pale golden orange; upper part of opercle steel blue; soft dorsal, caudal, anal, ventrals and pectorals orange or yellowish red more intense than in the adult.

D 9 or 10—1/26, 27 or 28, C 17 $\frac{5}{8}$, A 2/7, V 1/5 P 20, Br. VII.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singa-
Malabar, Celebes, Madura, Batavia.* [pore.

TOTAL LENGTH: 2 feet 7 inch.

The length of the head is $\frac{1}{4}$ of the total, its greatest vertical diameter exceeds by $\frac{1}{4}$ half the length of the head. The oblique diameter of the eye is $5\frac{1}{3}$ of the length of the head. The vertical diameter in front of the dorsal is $5\frac{1}{2}$ of the total length. On each side of the symphysis of the upper jaw appear two, sometimes three canines, of which the posterior, or centre one when three are present, is the longest, but all are shorter and more distant than those of *O. ruber*. The canines are succeeded by a series of distant conical teeth of a comparatively larger size than those in *O. ruber*. Behind the external series is an inner one of velvety teeth. On each side of the symphysis of the lower jaw is a very small canine, preceding a series of velvety teeth, behind which is an inner series of large dis-

tant conical teeth, some of which in size exceed the lower canines. The lateral line describes an arch, terminating opposite the middle of the soft dorsal fin, from whence it proceeds horizontally to the point of the caudal. The latter fin is rhomboidal; its length about $5\frac{1}{2}$ of the total. The stomach is elongated, cylindrical, containing fishes and *Crustacea*. There are six cœcopyloric appendages. The body of the air-vessel is very narrow, lanceolate, about $\frac{1}{4}$ of the length of the fish, terminating in a fine point. From each side of the body of the air-vessel proceed 25 branched processes, of which the anterior are the longest and have the greatest number of branchlets.

At Pinang this species is taken in numbers from June till August. It is valued by the natives as an article of food. Owing to the small size of the air-vessel, it yields but a small quantity of isinglass, the quality of which however is considered very good. M. M. Cuvier and Valenciennes have observed this species figured in Colonel Farquhar's collection of drawings at the India House, and its name is said to be at Malacca: *Ikanhampay*, which most likely is a mistake for *Salampai*, the Malayan denomination of *O. biauritus*.

OTOLITHUS MACULATUS, Kuhl and Van Hasselt.

Otolithus maculatus, Cuv. and Val. V. 64.

Jarang gigi of the Malays.

Head above and back iridescent yellowish brown, lighter, silvery on the sides; cheeks, preopercle and abdomen silvery buff; upper part of opercle steel blue; lateral line shining silvery; on the back and sides to within a little beneath the lateral line, a number of brownish spots, the scales of each spot edged with black; dorsal, anal, ventral and pectoral fins yellowish light grey, their membranes minutely dotted with brown; caudal rays silvery at the base; posterior half and membrane brownish yellow; single large irregular black spots scattered over the fin. Iris pale golden, blackish towards the orbit.

D 10— $1/34$, C $17\frac{5}{8}$, A $2/11$, V $1/5$, P 18, Br. VII.

HABIT.—*Sea and estuaries of Pinang, Malayan Peninsula, Singa-
Batavia.* [pore.

TOTAL LENGTH: 2 feet 9 inch.

The length of the head is $3\frac{3}{4}$ of the total; its greatest vertical diameter exceeds by $\frac{1}{7}$ half the length of the head. The oblique diameter of the eye is a little more than $\frac{1}{2}$ of the length of the head. The ver-

tical diameter of the body in front of the dorsal is $5\frac{1}{2}$ of the total length.

The dentition resembles that of *Otolithus ruber*, but the external series of the lower jaw consists of fewer, more distant and stronger conical teeth. The lower jaw greatly projects beyond the upper. In the adult the caudal fin is nearly rounded; its length is $7\frac{3}{4}$ of the total. The pectorals and ventrals are comparatively short, their length equaling that of the caudal. The stomach is very elongated, cylindrical, thin. In it were found fishes, shells of a *Cerithium*, and *Crustacea*. The air-vessel is very large, broad lanceolate, tapering behind into a fine point. The length is one half of the body, the caudal fin not included. Each side has from 52 to 55 branched processes, the number of which differs not only individually, but from side to side. The lower abdominal surface of the body of the vessel is perfectly smooth, and as usual, silky white, but the upper or vertebral surface is longitudinally divided by a narrow furrow, from which proceed a number of distant, backwards arched, transversal lines or ribs. The intervals between the latter are filled up by short backwards bifurcating raised lines, of which those nearest the central furrow are directed obliquely inwards; but they increase in length, and become longitudinal towards the margin of the vessel, while those covering the lateral branched processes deviate outwards and are much longer than the rest. Thus the whole of the upper or vertebral surface of the air-vessel presents a kind of raised network of singular beauty. This species, although not uncommon, appears at Pinang to be less numerous than the others, which it accompanies. It is reported to be flavourless, but it is highly valued for the sake of the air-vessel, which yields a considerable quantity of the best kind of isinglass.

OTOLITHUS VERSICOLOR, Cuv. and Val.?

Russell CIX. Pottee Kanasah?

Otolithus versicolor, Cuv. and Val. V. 64?

Jarang gigi of the Malays.

Young. Head above and back iridescent greyish green, lighter on the sides; cheeks and preopercle silvery; opercle steel-blue; sides beneath the lateral line silvery white; lateral line shining silvery; fins yellowish buff; membrane of the spinous dorsal and marginal half of the soft, of the anal and caudal minutely dotted with black, on the

latter fin so closely as to produce a general blackish colour. Iris narrow golden round the pupil; the rest bluish black.

D 10— $1\frac{1}{2}$, C $17\frac{5}{8}$, A $2\frac{1}{7}$, V $1\frac{1}{5}$, P 18, Br. VII.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH : $6\frac{1}{2}$ inch.

The length of the head is about $\frac{1}{4}$ of the total; its greatest vertical diameter exceeds one half the length by $\frac{1}{7}$. The oblique diameter of the eye is $5\frac{1}{2}$ of the length of the head. The vertical diameter in front of the dorsal is about $\frac{1}{6}$ of the total length.

The dentition, as represented by Russell, resembles that of *O. maculatus*. The broad triangular part of the upper jaw at the angle of the mouth, is finely radiated, but without the large triangular impression, which appears in some of the other species. The second anal spine is proportionally stronger than in the other species; its length slightly exceeds $\frac{1}{2}$ of the anterior ray, and the two lateral surfaces are compressed, finely radiated, whereas in the preceding species this spine is rounded. The air-vessel is lanceolate with numerous lateral branching appendages; its length equals that of the head, or about $\frac{1}{4}$ of the total length. The only individual observed, occurred at Pinang in 1844. It resembles more *O. versicolor* than any of the preceding species: Russell indeed gives 21 dorsal rays, but their number varies considerably in all. In the present, as well as in the young of the preceding, the caudal fin is proportionally much longer and more pointed than in the adult, and the eye is also proportionally larger.

GEN. JOHNIUS, *Bloch-Schneider*, 1801.

Velvety teeth in both jaws: in the upper an external series of arched teeth, considerably longer and more distant than the rest; in the lower an internal series of conical teeth somewhat longer than the rest. Differs from *Sciæna* by the comparative greater thickness and length of the second anal spine, which is nearly two thirds of that of the first ray.

JOHNIUS DUSSUMIERI, (Cuv. and Val.)

Corvina dussumieri, Cuv. and Val. V. 119.

Head above and back dark greenish brown, paler, silvery on the cheeks, preopercle and sides; opercle steel-blue; the scales minutely dotted with brown; abdomen pearl-coloured; membrane of dorsal transparent, minutely dotted with brown, edged with black; caudal

and anal yellowish white, minutely dotted with black, their marginal part blackish; ventrals white; upper half of pectorals brownish, lower yellowish white. Iris silvery, upper part bluish black.

D 10—1/28 or 29, C 17 $\frac{5}{8}$, A 2/7, V 1/5, P 19, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Malabar.

TOTAL LENGTH: 6 $\frac{4}{8}$ inch.

The teeth of the external series of the upper jaw are distant, but little longer than those of the internal. Under the symphysis of the lower jaw appear five pores. The anterior part of the air-vessel is dilated, forming a rounded lateral process on each side of the vertebral column. Immediately behind them the body of the vessel is constricted, and the rest presents a broad lanceolate form, tapering backwards into a sharp point. From each side proceed ten processes of which the eight are branched, but the two posterior pairs, the longest, are either simple or bipartite. The length of the air-vessel is about $\frac{1}{4}$ of the total.

At Pinang single individuals occur at all seasons. The isinglass is reputed good, but as the fish is of small size and not numerous, but little is procurable.

JOHNIUS BELENGERI, (Cuv. and Val.)

Corvina belengeri, Cuv. and Val. V. 120.

Corvina belengeri, Bélanger, 358.

Colours similar to those of *J. dussumieri*, but the body and fins so closely dotted with black and brown as to impart a general pale brownish appearance; the marginal half of the caudal, anal and ventral fins blackish. Iris silvery, upper half bluish black.

D 10—1/28, 29 or 30, C 17 $\frac{5}{8}$, A 2/7, V 1/5, P 17, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Malabar.

TOTAL LENGTH: 6 $\frac{4}{8}$ inch.

The teeth of the external series of the upper jaw are less distant, and rather longer than in *J. dussumieri*. There are five pores under the symphysis of the lower jaw. The form and length of the air-vessel is that of *J. dussumieri*; each side has ten branching processes, shorter, however, and apparently placed at a greater distance from each other than in the former species. The three posterior pairs are much longer

than the preceding, the eighth and ninth bipartite, the tenth pair is undivided, pointed. Also this species occurs singly at Pinang.

The two preceding species not only closely resemble each other, but also a third: *Johnius coitor*, (Buchanan Hamilton.*) Their external distinguishing characters will appear from the following table.

	<i>Johnius dussu- mieri.</i>	<i>Johnius belengeri.</i>	<i>Johnius coitor.</i>
Length of the head ..	$4\frac{1}{2}$ in total length	$\frac{1}{3}$ of total length.	$\frac{1}{3}$ of total length.
Depth at occiput	$\frac{3}{4}$ of the length of the head.	$\frac{9}{11}$ of the length of the head.	$\frac{2}{3}$ of the length of the head.
Diameter of the eye ..	$\frac{1}{4}$ of do.	$3\frac{1}{8}$ in do.	$5\frac{1}{2}$ in do.
Distance from the muzzle to the eye.....	equal the diameter of eye.	$\frac{1}{8}$ less than the diameter.	exceeding the diameter by $\frac{1}{2}$
Depth in front of dorsal fin	$5\frac{1}{4}$ in total length.	$\frac{1}{3}$ of total length.	$\frac{4}{5}$ of total
Length of the posterior anal spine	slightly exceeding $\frac{1}{2}$ of first anal ray.	$\frac{2}{3}$ of the first ray but slenderer than in <i>coitor</i> .	$\frac{2}{3}$ of the first anal ray.

JOHNIUS CARUTTA, Bloch.

Johnius carutta, Bl. Pl. 356.

Corvina carutta, Cuv. and Val. V. 124.

Head above and back dark brown claret colour, lighter, silvery on the cheeks, opercles, sides and abdomen; the scales minutely dotted with black, and their margins of a darker brown than the ground colour; fin-membranes pale whitish yellow, minutely dotted with black; the upper half of the spiny dorsal, from 2^d. to 7th. spine, black; the soft dorsal with four equidistant, large, oblique black spots; the marginal half of the caudal, anal and ventral fins blackish. Iris golden, the orbital half bluish black.

D 10—1/28, C 17 $\frac{2}{7}$, A 2/8, V 1/5, P 18, Br. VII.

HABIT.—*Sea of Pinang.*

Malabar; sea and rivers Tranquebar, Pondicherry.

TOTAL LENGTH: 6 inch.

The length of the head is $4\frac{1}{3}$ in the total, the depth at the occiput $\frac{3}{4}$ of its length. The transversal diameter of the eye is $\frac{1}{4}$ of the length of the head, equal to its distance from the muzzle. The vertical diameter in front of the dorsal fin, is little less than the length of the

* SYN. *Bola coitor*, Buchan. Ham. 75, 368, Pl. 27, Fig. 24.—*Corvina coitor*, Cuvier and Valenciennes, V. 116.

head. The external series of teeth of the upper jaw is but little larger than the external; the velvety teeth of the lower jaw, form a broader band than those of the upper. Under the symphysis of the lower jaw appear four pores. The second anal spine is very thick, $\frac{2}{3}$ of the length of the first ray. A single individual was observed at Pinang in May 1845.

JOHNIUS DIACANTHUS, (Lacépède.)

Lutjanus diacanthus, Lacépède IV. 195, 244.

Russell CXV. Nalla Katchelee. (*Adult.*)

Russell CXVI. Katchelee. (*Young.*)

Johnius cataleus, Cuvier, R. A. II. 173(4.)

Corvina catalea, Cuvier and Valenciennes, V. 128.

(*Icon.*) Sciaena maculata, Gray, Ill. Ind. Zool. II. Pl. 89, Fig. 3.

(*Young.*)

Corvina catalea, Bélanger, 360.

Corvina catalea, Richardson: Rep. 1845, 226.

Corvina nalla katchelee, Richardson l. c.

Corvina catalea, Bleeker: Verh. Batav. Gen. XXII. 4.

Ikan Tambaréh of the Malays.

Young. Head above and back dark brown claret colour; cheeks, preopercle, and sides to a little beneath the lateral line lighter with lilac silvery reflection, the scales edged with dark brown, and the back and upper half of the sides with numerous larger and smaller round black spots; lower half of the sides silvery buff; the scales minutely dotted with brown; opercle silvery lilac or blue; dorsal and caudal fin membranes brownish buff, minutely dotted with brown, and with more or less numerous large black scattered spots; anal, ventrals and pectorals brownish buff at the base, the rest pale neutral tint, minutely dotted with brown, and the marginal half black.

Adult. Head and sides darker, with or without indistinct black spots; sides beneath the lateral line pale silvery bluish or lilac brown; opercle blackish blue; branchiostegous rays and membrane pale lilac silvery; dorsal-, caudal- and anal membranes pale yellowish brown, minutely dotted with brown, with or without indistinct large dark brown spots; ventrals and pectorals yellowish brown, posterior half blackish. Iris silvery lilac, minutely dotted with brown; the orbital half, bluish black.

D 10—1/24, C 17 $\frac{5}{5}$, A 2/7, V 1/5, P 19 or 20, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Malabar, Coromandel, Bay of Bengal, Gangetic estuaries,
Tenasserim, Canton, China Seas, Madura, Java.

TOTAL LENGTH: 2 feet 9 inch.

The length of the head is $3\frac{1}{2}$ in the total, the caudal fin not included. In the young the latter fin is rhomboidal, very pointed, and its length equal to that of the head; but with age the point becomes worn, and in the adult the length is but $\frac{2}{3}$ of that of the head, or equal to the depth at the occiput. The oblique diameter of the eye is a little less than $\frac{1}{6}$ of the length of the head; the distance from the muzzle to the eye exceeds the diameter by $\frac{1}{2}$. The vertical diameter in front of the dorsal fin is $\frac{1}{4}$ of the total length. The teeth of the external series of the upper jaw are long, distant, and there is generally a canine on one or both sides, at a little distance from the symphysis. The lower jaw has a smaller canine on each side of the symphysis, and an internal series of longer conical teeth. Under the symphysis appear four large pores, and in some a fifth, very minute. The air-vessel, $\frac{1}{3}$ of the length of the fish, is of a broad, lanceolate shape, tapering behind into a very elongated point. Each side has 20 to 24 processes, of which the two posterior pairs are simple or bipartite; the rest branching. The contents of the stomach of one dissected were the remains of a species of *Leptocephalus* and an eel, of Crustacea, and of a *Loligo*. At Pinang individuals of this species occur at all seasons, but in numbers and of the largest size, from June to August. They are not only valued as articles of food, but also on account of the quantity and quality of the isinglass, which sells in the China market from 40 to 45 Spanish Dollars per Pikul.

JOHNIUS MACULATUS,* Bloch-Schneider, VAR.?

Head above and back dark greyish green, lighter, silvery on the cheeks, opercles and sides, the scales minutely dotted with black, not, however, sufficiently to influence the general colour; abdomen silvery; membrane of dorsal spines transparent with black margin; between the anterior six spines dotted throughout, and rather largely with black and brown; between the four posterior spines the central part of the

* SYN. Russell CXXIII. *Sari Kulla*.—*Johnius maculatus*, Bl. Schn. 75.—*Corrina maculata*, Cuvier and Valenciennes, V. 126.

membrane without dots; membrane of dorsal rays, caudal and anal yellowish white, minutely dotted with brown and black, their marginal portion blackish; pectorals and ventrals whitish, the latter dotted with black, particularly towards the margin. Iris silvery, dotted with black; upper orbital half bluish black.

D 10—1/23, C 17 $\frac{5}{5}$, A 2/7, V 1/5, P 19, Br. VII.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 5 inch.

The length of the head is $4\frac{1}{3}$ in the total, its vertical diameter at the occiput $\frac{3}{4}$ of the length. The oblique diameter of the eye is $3\frac{1}{2}$ in the length of the head; the distance from the muzzle is less than the oblique diameter. The vertical diameter in front of the dorsal fin equals the length of the head. The distance from the orbit, across the infraorbitals, exceeds $\frac{1}{2}$ of the diameter of the eye. This character may serve at once to distinguish a very closely allied species: *Johnius chaptis** (Buchan. Ham.), in which the breadth of the infraorbitals is much less. The anterior teeth of the external series of the upper jaw are rather long and closely set; the rest are scarcely longer than the rather broad internal series of velvety teeth. Under the symphysis of the lower jaw appear five pores. The lower part of the rounded margin of the preopercle is distinctly and distantly toothed. The opercle terminates in two flat spines. The lateral line is distinct; on each scale appears a small longitudinal tube, from whence proceed an upper and lower oblique process. Most of the scales of the sides have each a central oblique line. The second anal spine is rather strong, longitudinally radiated, and $\frac{2}{3}$ of the length of the first ray. The caudal fin is rhomboidal somewhat rounded at the point. From the defective descriptions of *Johnius maculatus*, it is impossible to determine if the present is specifically distinct or a variety. A single individual was observed in 1844 at Pinang. The form of the air-vessel and the number of the lateral appendages resemble those of *Johnius belengeri*.

SUB-GEN. CORVINA, Cuvier, 1829.

Differs from *Johnius* by the comparatively greater size of the second anal spine, the length of which nearly equals that of the first anal ray.

* SYN. *Bola chaptis*, Buch. Ham. 77, 368, Pl. 10, Fig. 25.—*Corvina chaptis*, Cuvier and Valenciennes, V. 130.

CORVINA SOLDADO, (Lacépède.)

Holocentre soldado, Lacépède, IV. 344, 373.

Russell CXVII. Tella Katchelee.

Corvina* miles, Cuvier and Valenciennes, V. 94, IX. 474.

Sciæna argentea, Kuhl and Van Hasselt MS. Cuv. and
[Val. V. 95.]

Adult. Head above and back iridescent greyish green; lighter, silvery on the cheeks, preopercle and sides; opercle steel-blue in the centre; abdomen pearl-coloured; membrane of dorsal spines transparent, minutely dotted with black and brown, and with black margins; membrane of the rays near the root, and in front of each ray, with a small brownish spot; upper third minutely dotted with brown, the margin black; ventrals whitish; the rest of the fins pale yellowish white, the membranes and rays minutely dotted with black on the marginal half, so closely as to impart a general blackish colour. Iris silvery, upper orbital half bluish black.

Young. Of general lighter colours; fins of a deeper yellow; anal spines and three anterior rays and their membrane dotted with brown.

D 10—1/29 or 9—1/30, C 17⁵/₈, A 2/7, V 1/5 P 16 or 17, Br. VII.

HABIT.—*Sea of Pinang.*

Java, Tenasserim, Coromandel, Bombay.

TOTAL LENGTH: 2 feet.

The length of the head is about $4\frac{1}{3}$ in the total; the depth at occiput $\frac{1}{7}$ less than the length. The oblique diameter of the eye is a little less than $\frac{1}{4}$ of the length of the head; the distance from the muzzle equals the diameter of the eye. The vertical diameter, in front of the dorsal, slightly exceeds the length of the head. The air-vessel is about $\frac{1}{3}$ of the total length, elongated oval, with numerous lateral branching appendages, which increase in length towards the posterior extremity. Four pores appear under the symphysis of the lower jaw. Small individuals occur at Pinang at all seasons; larger ones but rarely. The fish is eaten by the natives, and the few air-vessels procurable, are valued as good isinglass. M. Dussumier found this species abundant at Bombay.

GEN. UMBRINA, Cuvier, 1817.

Differs from *Johnius* in having a cirrus under the symphysis of the lower jaw.

* Misprinted "*Sciæna*."

UMBRINA RUSSELLI, Cuvier.

Russell CXVIII. Qualar Katchelee.

Umbrina russelli, Cuv. and Val. V. 178.

Umbrina russelli, Richardson: Report 1845, 226.

Ikan Gulama of the Malays.

Young. Head above and back silvery greyish green, lighter on the sides above the lateral line; cheeks, opercles and beneath the lateral line shining silvery; from the vertex, between the eyes, a blackish band obliquely backwards over the temple, terminating on the opercle in a large steel-blue spot; behind the occiput a broader black band obliquely downwards to the origin of the lateral line; membrane of the dorsal spines blackish, minutely dotted with brown; of the rays the upper half minutely dotted with brown and black, the lower transparent; the rest of the fins pale orange.

Adult. Body paler; in certain lights reflecting fifteen obliquely backwards ascending lines; no trace of the blackish band of the temples, and but a faint of the occipital; a pale steel-blue spot on the opercle; membrane of dorsal spines brownish. Iris silvery, upper orbital half bluish black.

D 10—2/27 or 10—1/26, C 17 $\frac{5}{8}$, A 2/7, V 1/5 P 17, Br. VII.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Vizagapatam, Indian and China Seas.

TOTAL LENGTH: 6 inch.

The length of the head is $4\frac{1}{3}$ in the total; the depth at occiput $\frac{1}{2}$ less than the length. The oblique diameter of the eye is $\frac{1}{4}$ of the length of the head, equalling the distance of the eye from the muzzle. The vertical diameter in front of the dorsal fin is $\frac{1}{3}$ of the length of the body, the caudal not included, but with the latter fin it is $3\frac{2}{3}$ in the total length. The teeth of the external series of the upper jaw, are but little longer than the rest, and rather closely set. The cirrus is thick, fleshy; in the adult fish its length equals the lower jaw to the angle of the mouth, but it is shorter in the young. On each side of and a little behind the cirrus appear two large pores. The fold of the skin covering the infraorbitals and the upper maxillary forms a small rounded lobe on each side of the muzzle. The vertical distance from the lower part of the orbit down the fold is $\frac{2}{3}$ of the oblique diameter of the eye. The lateral line consisting of a small central tube on each

scale, follows the arch of the back till opposite the middle of the anal, from whence it proceeds nearly straight to the point of the rhombic caudal fin. In individuals with 12 dorsal spines, the eleventh is slightly, the twelfth much longer than the tenth, and their membranes much narrower than those connecting the rest, which from the fourth gradually decrease in length. The pectorals are pointed, their length equalling that of the caudal. The second anal spine, $\frac{4}{5}$ of the first ray, is compressed, broad except near the root where it is somewhat narrowed. The air-vessel about $\frac{1}{3}$ of the length of the fish, is elongated oval, terminating in a long thin point. From each side proceed 14 to 16 appendages, of which the two posterior ones are simple or bipartite, and much longer than the preceding branching ones. At Pinang this species is of too rare occurrence to make it valuable as an article of food, or as yielding isinglass, although the latter is considered of good quality. The fishermen assert that individuals upwards of a foot in length have been taken.

GEN. PRISTIPOMA, *Cuvier*, 1817.

Dorsal fin single, and, as well as the anal, without scales; * angle of opercle blunt, or hid in the membrane; the external series of the velvety teeth stronger than the rest; under the symphysis of the lower jaw two pores, behind which a small fosset; branchiostegous rays seven.

PRISTIPOMA COMMERSIONI, (Lacépède.)

Labre commersonien, Lacép. III. 431, 477, Pl. 23, Fig. 1.

Lutjan microstome, Lacép. III. Pl. 34, Fig. 2; IV. 181, 216.

Labrus commersonii, Shaw, IV. 493.

Pristipoma kaakau, Cuv. and Val. V. 244, XIII. 8¹³.

Pristipoma commersonii, Cuv. and Val. V. 252.

Pristipoma kaakan? Rüppell: N. W. Fische, 123, Taf. 30,
[Fig. 1.

Pristipoma kaakan, Richardson: Rep. 1845, 227.

Pristipoma kaakan, Bleeker: Verh. Batav. Gen. XXII. 3.

(*Young*). Head above and back pale greyish green; opercle bluish silvery, the posterior part minutely dotted with black; cheeks, sides and abdomen silvery; the back and upper part of the sides minutely dotted with black and with distant indistinct brownish spots; fin

* As observed by M. Swainson, this character does not exist in all species.

membranes transparent; between the dorsal spines with a black margin and with two or three series of brownish spots; between the dorsal rays two transversal series of smaller brownish spots; posterior half of caudal pale blackish. Iris golden.

D 12/14, C $17\frac{8}{8}$, A 3/7 or 8, V $1\frac{1}{5}$, P 17, Br. VII.

HABIT.—*Sea and estuaries of Pinang, Singapore.*

Sea and estuaries of Coromandel, Malabar, Island of Lantao, China Sea, Bali, Java, Sumbawa, Celebes.

TOTAL LENGTH: 7 inch.

The length of the head and the greatest vertical diameter of the body are contained $3\frac{1}{2}$ times in the total length. The fourth dorsal spine equals half the greatest vertical diameter of the body. The second anal spine is two thirds of the vertical diameter above it, and as long as the fourth dorsal, but stronger. Individuals of the length described are excessively numerous at all seasons at Pinang and Singapore, where they are consumed by the natives either fresh or dried.

PRISTIPOMA GUORACA, Cuv. and Val.

Perca grunniens, Froster?

Anthias grunniens, Bloch-Schneider. 308?

Russell CXXXII. Guoraka.

Pristipoma guoraca, Cuv. R. A. II. 176^(1.)

Pristipoma guoraca, Cuv. and Val. V. 256.

Pristipoma guoraca, Bélanger, 363.

Head above and back pale blackish olive; cheeks, opercles and sides silvery grey with blue and golden reflections; abdomen silvery yellowish white; most of the scales have the edges minutely dotted with brown, and those above the lateral line a pale brown spot at the root, forming six or seven indistinct parallel lines; fins pale yellowish; membrane of the dorsal minutely dotted with brown, between the spines one or two series of large clouded brown spots, and a single series of smaller between the rays; margins of the dorsal and caudal blackish; the membrane of the latter and of the anal slightly dotted with brown. Iris golden.

D 12/14, C $17\frac{6}{6}$, A 3/8, V $1\frac{1}{5}$, P 18, Br. VII.

HABIT.—*Sea of Pinang.*

Isle of Tanna, Batavia, Coromandel, Mahé (Fresh-water).

TOTAL LENGTH: 1 foot.

The air-vessel is elongated, nearly one third of the total length, swelling in the middle, terminating in a point; the anterior extremity is blunt and appears to have on each side a pointed process, a little less than one third of the length of the vessel itself, which is restricted at the origin of the lateral processes. The second anal spine is excessively thick, striated on the anterior surface; its length slightly exceeds one half of the vertical diameter of the body above it, but it is considerably less than one half of the vertical diameter at the pectorals. This spine is therefore comparatively shorter in the present species than it is in *P. kaakan*, Cuv. and Val. which it however much resembles in distribution of colour and other characters. The fish is finely flavoured, but its isinglass is of little value, as the air-vessel is very thin. At Pinang it is of very rare occurrence.

PRISTIPOMA NIGRUM, Mertens.

Pristipoma nigrum. Cuv. and Val. V. 258.

Young. Blackish brown, opercles pale silvery; membrane of dorsal spines pale brown with lilac reflections, margin black; soft part of dorsal and anal blackish brown with whitish yellow margin; pectorals and caudal whitish yellow with a blackish vertical band at the root; ventrals blackish brown. Iris King's-yellow with a black orbital margin.

D 14/16, C $17\frac{1}{7}$, A 3/7, V $1\frac{1}{5}$, P 17, Br. VII.

HABIT.—*Sea of Pinang*.

Manila.

TOTAL LENGTH (*of the young*): $2\frac{4}{8}$ inch.

The head is $\frac{1}{3}$ of the length of the body, not including the caudal which is $\frac{1}{5}$ of the total length. The greatest vertical diameter of the body is $\frac{1}{3}$ of the total length. The eye occupies the second third of the head. The basal half of the soft dorsal, anal, and of the caudal fin covered with minute scales.

This fish, of which a single individual was observed in 1845 at Pinang, appears to be the young of *P. nigrum*, from which it merely differs by the yellowish colour of the caudal, pectorals and of the margins of soft dorsal and anal fins.

PRISTIPOMA PAIKEELI, Cuv. and Val.

Russell CXXI. Paikeeli.

Pristipoma paikeeli, Cuv. R. A. II. 176 ^(1.)

Pristipoma paikeeli, Cuv. and Val. V. 259.

Silvery brownish white; abdomen buff; on the back and sides as far as the pectoral fin six parallel longitudinal bands, Van Dyke brown, each enclosed by two black lines; fin-membranes yellowish white, all except the pectoral minutely dotted with brown; the margin of the spinal part of the dorsal black; the upper half of the soft part, and the posterior margin of the caudal blackish. Iris golden.

D 12/15, C 17 $\frac{2}{3}$, A 3/9, V 1/5, P 17, Br. VII.

HABIT.—*Sea of Pinang.*

Madras, Vizagapatam.

TOTAL LENGTH: 6 inch.

The figure of Russell represents the dorsal spines much too slender, and the caudal fin too deeply cleft. It is also defective in not representing the minute scales half covering the membrane of the dorsal rays, of the caudal, anal and of the ventrals. A single individual observed at Pinang in 1845, had nine anal rays, (the last one double.)

PRISTIPOMA CARIPA, Cuvier.

Anthias maculatus, Bloch, Pl. 326. Fig. 2?

Lutjan tacheté, Lacépède, IV. 239.

Russell CXXIV. Caripe.

Pristipoma caripa, Cuv. R. A. II. 176 ^(1.)

Pristipoma caripa, Cuv. and Val. V. 261.

Head above and back brownish black, sides silvery brownish white; cheeks and abdomen silvery white, bluish on the opercles; over the infraorbitals an oblique blackish band, edging the orbit; a second from the occiput, edging the margin of the preopercle and the opercle; a third in front of the dorsal to just beneath the lateral line; three or four blackish spots along the back, three larger, placed in quincunx towards the former, along the lateral line; membrane of dorsal spines hemi-transparent, edged and minutely dotted with black, and with a large black spot between the 4th, 5th, 6th, 7th and 8th spine; upper half of the soft dorsal minutely dotted with black, and with a small indistinct blackish spot in front of the six anterior rays; the other fins pale yellowish white; the membrane of the caudal and anal minutely dotted with brown. Iris golden.

D 12/14, C 17 $\frac{2}{3}$, A 3/7, V 1/5, P 16 or 17, Br. VII.

HABIT.—*Sea of Pinang.*

Batavia, Coromandel, Malabar.

TOTAL LENGTH: 5 inch.

Two individuals together were observed in 1845 at Pinang, where the fishermen asserted the species to be very seldom seen, and never of larger size.

PRISTIPOMA AURITUM, Cuv. and Val.

Pristipoma auritum, Cuv. and Val. V. 263.

Upper part of the muzzle dark brown, of the rest of the head the upper half of the opercle and of the lax gill-membrane and the cheeks light brownish grey with silvery reflections; preopercle, lower half of opercle and of the gill-membrane silvery yellowish-white, minutely dotted with brown; back and upper part of the sides light greyish green, lower part of the latter and abdomen yellowish white; the scales of the occiput and upper half of the body with a reddish brown spot at the root, reflecting lilac and forming irregular series or longitudinal lines; the scales of the lower half of the sides silvery at the root, and minutely dotted with brown; fin-membranes whitish transparent, minutely dotted with brown, rays yellowish white; between the dorsal spines numerous reddish brown round or elongated spots, forming from 3 to 6 oblique series; the margin of the membrane black; between the dorsal rays some rounded smaller spots, forming 4 transversal lines. Iris golden.

D 12/14, C 17 $\frac{2}{2}$, A 3/7 or 8, V 1/5, P 17, Br. VII.

HABIT.—*Sea of Pinang.*

Siam.

TOTAL LENGTH: 1 foot 8 $\frac{5}{8}$ inch.

The eye occupies the third seventh of the length of the head when the muzzle is protracted; the length of the opercle is little less than one half of that of the head; it is convex and projects backwards above the anterior half of the pectoral; the mouth is comparatively very small with few teeth; the external series under the symphysis of the upper jaw is a little stronger than the rest; those few in the lower jaw nearest the angle of the mouth are the largest, nearly conical. The length of the second anal spine equals that of the fourth dorsal, the longest, and it is nearly $\frac{3}{4}$ of the vertical diameter of the body immediately above it. The anterior surface of all the spines is longitudinally furrowed. The caudal fin is covered almost throughout with minute rough scales, so as entirely to hide the short accessory rays; the mem-

brane of the ventrals is scaly ; the rest naked. This fish but rarely occurs at Pinang, where it is highly valued on account of its excellent flavour and firmness of flesh. Of four at different times examined, the smallest measured 1 foot 5 inches in length : in external characters all resembled each other except in the number of anal rays, varying from 7 to 8, the last one being double. M. M. Cuvier and Valenciennes describe the specimen discovered by Dr. Finlayson in Siam, with 11 dorsal spines, whereas those from the sea of Pinang present 12. In other characters the latter so perfectly agree with the description, that their identity appears to admit of no doubt.

GEN. PLECTORHYNCHUS, *Lacépède*, 1801.

(DIAGRAMMA, *Cuvier* 1817.)

Two minute pores under the symphysis, and two fossets on each branch of the lower jaw ; preopercle toothed ; lips folded and turned back.

PLECTORHYNCHUS BLOCHII, (*Cuvier* and *Val.*)

Anthias diagramma, *Bloch*, Pl. 320.

Sparus diagramma, *Shaw*, IV. 440, Pl. 65.

Diagramma blochii, *Cuvier* and *Valenciennes*, V. 312.

Young. Ground-colour of the head, cheeks, opercles and upper half of the body bright orange, lower half yellowish white ; from between the eyes a longitudinal brown band following the back, continuing above the base of the soft dorsal fin ; a second from the muzzle above the orbit, dividing in two portions which again unite above the middle of the pectoral fin, and continue straight to the posterior part of the soft dorsal ; a third, the broadest, from the eye straight to the root of the caudal ; a fourth under and following the course of the latter ; a fifth and sixth of lighter brown, from the muzzle to the posterior part of the abdomen ; a seventh similar from the gill-opening to the posterior part of the root of the anal fin. The margin of the dorsal membrane black, base and upper part orange, intermediate part milk white ; between the root of the third and fourth dorsal spine a black spot ; from the point of the second to the base of the eighth spine a broad oblique black band, continuing straight to the middle of the soft dorsal, where it unites with the first band of the body, and thus continues to the posterior part of the fin ; caudal orange with scattered irregular black spots ; anal and ventrals greyish, posterior part black ; pectorals

orange with a black band across the root, the centre and the point. Iris golden orange.

D 10/23, C $17\frac{2}{7}$, A $3/7$, V $1/5$, P 17, Br. VII.

HABIT.—*Sea of Pinang*

Southern coast of Ceylon.

TOTAL LENGTH : $5\frac{5}{8}$ inches.

As observed by M. M. Cuvier and Valenciennes this species differs from *Plectorhynchus lineatus*, (Linné,)* in the greater length of the second, third and fourth dorsal spines, which equals or even slightly exceeds one half of the greatest vertical diameter of the body, and in the comparative shortness of the anterior dorsal spine, which is one third of the length of the second. The first anal spine scarcely exceeds one fourth of the second, which as well as the third, equals the length of the tenth dorsal spine, and slightly exceeds one third of the greatest vertical diameter of the body. The number of fin rays given by M. M. Cuvier and Valenciennes : D 12/16? A 2/7, appears to be incorrect. In fresh state the prevailing, or ground colours of the fish are orange and yellowish white. In the absence of a detailed description of *Bodian cuvier*, Bennett, (*Fishes of Ceylon*, 13,) the species cannot be determined. If the relative proportions of the dorsal spines as represented in the figure, are correct, the fish would appear to be *P. lineatus*.

A single individual was observed at Pinang in 1845.

PLECTORHYNCHUS BALTEATUS, (Kuhl and Van Hasselt.)

Diagramma balteatum, K and V. H. Cuv. and Val. V. 316.

Bright yellow and black striped ; upper part of the back and sides black : a bright yellow narrow longitudinal band from the occiput to the commencement of the soft dorsal fin, sending a short vertical portion to the third dorsal spine ; a second yellow broader band from above the orbit straight over the posterior part of the soft dorsal ; next a black band from the muzzle, through the eye, across the cheek and opercle, straight to the caudal over which it continues ; next a yellow band, bordered beneath by a pale bluish black, following the abdomen to the caudal ; cheeks and lower half of opercles yellow

* SYN. Seba III. XXVII. Fig. 18.—*Perca diagramma*, Linné, Syst. 1319.—*Anthias diagramma*, Bloch, 101, Pl. 9.—*Sciæna lineata*, Lin. Mus. A. F. I. 66.—*Perca lineata*, Linné, Syst. 1319.—*Grammistes lineatus*, Bloch, S. 182.—*Diagramma lineatum*, Cuv. and Val. V. 309.

washed with black ; abdomen yellow. Dorsal spines black, the membrane between the three anterior spines yellow, the rest black ; the soft part of the dorsal yellow with a black margin, beneath which a broad yellow longitudinal band, next a black, but the lower half of the six or seven posterior rays yellow, in continuation of the second yellow band of the body. Caudal fin yellow with a broad black margin, and longitudinally divided by a continuation of the central black band of the body. Anal yellow, lower half as far as the fourth ray black. Membrane, spine and three first rays of ventrals black ; the rest yellow. Pectorals white. On the centre of the whitish lips a black spot. Iris yellow with a transversal black bar.

D 10/23, C 17 $\frac{2}{3}$, A 3/7, V 1/5, P 16, Br. VII.

HABIT.—*Sea of Singapore.*

Java.

TOTAL LENGTH : 3 $\frac{5}{8}$ inch.

The head is contained 4 $\frac{2}{3}$ times in the total length ; the eye is situated a little in front of the second third of the head ; its diameter is a little less than one third of the length of the head. The greatest vertical diameter of the body is $\frac{1}{3}$ of the length, the caudal fin not included. The first dorsal spine is $\frac{1}{3}$ of the second, the longest, which slightly exceeds $\frac{3}{4}$ of the greatest vertical diameter of the body ; the third is a little shorter, the fourth equals half the depth of the body ; the rest gradually decrease, the tenth equalling the first. The second anal spine is remarkably short and slender, its length scarcely exceeding the first dorsal, the second anal is but little shorter and slenderer than the first. The preopercle is very finely toothed ; the opercles terminate in three small membranous points. The caudal fin is nearly rhombic, its length slightly exceeding $\frac{1}{5}$ of the total. The pectorals are the shortest fins, their length being contained 6 $\frac{1}{2}$ times in the total.

The intestinal canal is simple, about $\frac{1}{3}$ of the total length of the fish ; the stomach is elongated pyriform, the coats thickened : it contained minute shells. There are 5 cœcopyloric appendages, their length is nearly one half of the intestinal canal. The air-vessel is elongated triangular, its length about one third of the total ; from the sides of both its extremities proceed two lateral short, pointed processes, and six equidistant, shorter ones from each side ; its colour is white. A

few individuals (the one described the largest), were observed at Singapore in June 1840.

GEN. LOBOTES, *Cuvier*, 1829.

Muzzle short; lower jaw prominent; preopercle strongly toothed; the elongated rounded soft portion of the dorsal and anal fin, and the caudal giving the posterior part of the body a trilobate appearance; towards the symphysis of the lower jaw four groups of very minute pores. Branchiostegous rays six.

LOBOTES ERATE, *Cuvier and Val.*

Lobotes erate, *Cuv. and Val. V. 322.*

Lobotes farkarii, *Cuv. and Val. V. 324, (Young?)*

Lobotes erate, *Bleeker: Verh. Bat. Gen. XXII. 4.*

Ikan batu, or *Ikan pichat priuk*, of the Malays.

Young. Head and body blackish brown, light reddish brown, or brownish green, either uniformly or with large blotches of a lighter or darker shade; soft portion of dorsal and anal fin like the body, membrane black; caudal like the body, black towards the yellowish white margin, membrane of the dorsal and anal spines and ventrals brownish or greenish grey, tinged with orange; pectorals yellowish white.

Adult. Brownish lilac or mulberry coloured, either uniformly, or with large blotches of silvery grey; the scales either of the ground colour with silvery grey edge, or vice versâ; pectorals yellowish white; soft portion of dorsal and anal, and the caudal like the body, their terminal half bluish or greenish black; membrane of dorsal and anal spines light brown or grey marbled with blackish; ventrals dark bluish grey; throat, inter- and preopercle silvery grey. Iris silvery of the ground colour of the body.

D 12/15, C 17 $\frac{3}{5}$, A 3/12 or 11, V 1/5, P 15 or 16, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Java, Madura, Malabar, Ceylon, Bay of Bengal, Estuaries of the Ganges.

TOTAL LENGTH: 2 feet 5 inch.

The young differs from the adult in having the margin of the caudal fin or its posterior third, yellowish white, and in having comparatively fewer but much larger teeth or spines on the margin of the preopercle, particularly towards the rounded angle. As the latter is the principal distinguishing character assigned to *L. farkarii*, *Cuv. and Val.* it is

probable that Colonel Farquhar's drawing, upon which the description is founded represents a young individual of *L. erate*. Single individuals weighing upwards of 15 lbs, occur at Pinang at all seasons, and are dried by the natives. The air-vessel is very large, about $\frac{1}{3}$ of the total length, silvery white and of a lanceolate shape. It is excessively thin, and so firmly adhering to the back, that but a small part can be removed. The isinglass is by the Chinese dealers considered to be of good quality, but the small quantity procurable renders the fish less valuable in this respect.

GEN. SCOLOPSIS, *Cuvier*, 1817.

(SCOLOPSIDES, *Telfair*, 1830.)

The second infraorbital bone terminating in a rounded lobe, generally toothed, with a backwards directed spine at the angle adjoining the orbit; third infraorbital with a forwards directed spine, in some hid in the skin, crossing the former; preopercle toothed; submaxillary pores either absent or very minute; body oval or oblong with large scales; dorsal fin single; mouth moderate; teeth velvety; branchiostegous rays five.

SCOLOPSIS AURATA, (Mungo Park.)

Perca aurata, Mungo Park: Tr. Linn. Soc. III. 35.

Anthias vosmeri, Bloch, Pl. 321.

Lutjanus vosmeri, Lacépède, IV. 213.

Lutjan galon-d'or, Lacép. IV. 216.

Pomacentrus enneadactylus, Lacép. IV. 505, 508.

Scolopsides vosmeri, Cuv. R. A. II. 178^(1.)

Scolopsis argyrosomus, Kuhl and Van Hasselt, Cuv. and Val. V. 333.

Scolopsides vosmeri, Cuv. and Val. V. 333.

Head above red; back pale bluish green; sides light red with two indistinct mother-of-pearl coloured longitudinal bands above the lateral line, beneath which a third broader and distincter, terminating opposite the soft dorsal fin; cheeks, opercles and abdomen reddish white; infraorbitals greenish golden; all the scales, the infraorbitals, preopercle and opercle with vermilion edges; membrane of dorsal, anal and ventrals whitish transparent, spines and rays vermilion; caudal and pectoral membrane and rays pale vermilion. Iris reddish golden.

D 10/9, C 17 $\frac{3}{4}$, A 3/7 or 8 V 1/5 P 19, Br. V.

HABIT.—*Sea of Pinang.*

Java, Sumatra.

TOTAL LENGTH : $7\frac{5}{8}$ inch.

The eye occupies the second third of the length of the head, which when the muzzle is protracted, is $\frac{1}{4}$ of the total length. The greatest vertical diameter of the body is contained about $2\frac{1}{2}$ times in the total length ; the series of scales forming the lateral line are much smaller than the rest and of a triangular shape ; the upper lobe of the caudal is somewhat longer than the inferior ; the length of the anterior anal spine is one half of the second, which is as long as the pectoral spine, but much thicker. The cheeks are concave, and the ascending margin of the preopercle is salient, diverging from the opercle, its teeth distant, bent outwards, but generally pointing backwards. Most of the teeth have at the base a minute downwards pointed spine, which may be perceived by passing a finger from below upwards along the margin. The spine of the first infraorbital is long, bayonet-shaped ; beneath it appear two or three smaller ; these, the margin of the infraorbitals, preopercle, opercle, the spines and rays of the dorsal, anal and ventral fins, as well as the upper and lower margin of the caudal appear as if they were lackered with vermilion. Two individuals of nearly equal length were observed at Pinang in May and July 1845.

FAM. ANABANTIDÆ.

GEN. ANABAS, Cuvier, 1817.

Head rounded, broad ; muzzle very short, obtuse, more or less depressed ; the eye near the muzzle ; mouth small ; velvety teeth in both jaws ; a small transversal band of similar teeth on the anterior, and a few on the posterior part of vomer between the third upper pharyngeals ; margins of opercle, subopercle and interopercle strongly toothed ; branchiostegous rays six.

ANABAS SCANDENS, (Daldorf.)

Perca scandens, Daldorf: Linn. Tr. III. 62.

Anthias testudineus, Bloch, Pl. 322.

Lutjan tortue, Lacépède IV. 192, 235.

Lutjan grimpeur, Lacépède, l. c. 195, 239.

Amphiprion testudineus et *scansor*, Bloch-Schneider, 204.

Cephalopholis, id. 570.

Sparus testudineus, Shaw, IV. 471.

Anabas scandens, Cuv. R. A. (1817). II. 340.

Coius cobojus, Buchanan Hamilton, 98, 370, Pl. 13, Fig. 33.

Anabas testudineus, Cuvier, R. A. (1829) II. 226.

Anabas scandens, Cuv. and Val. VII. 325, Pl. 193.

(Icon.) *Anabas spinosus*, Gray: Ill. Ind. Zool. II. Pl. 89, Fig. 1.

Anabas scandens, Swainson, II. 237.

Anabas scandens, Cantor: Ann. Nat. Hist. IX. 28.

Anabas scandens, Richardson: Rep. 1845, 250.

Anabas scandens, Jerdon: Madras Journal, XV. 144.

Anabas scandens, Bleeker: Verh. Bat. Gen. XXII. 4.

Harooan of the Malays.

Adult. Head above and back dark green, lighter on the sides, abdomen greenish silvery; the membrane between the two largest opercular spines black, forming a rounded spot; dorsal and anal spines and membranes pale greenish lilac, minutely dotted with brown; soft part of dorsal and anal, as well as caudal fin greenish grey. Iris narrow golden round the pupil; the rest golden brown, amber, or pale crimson; the upper half of the orbital margin green bronze.

Young. Body and the single fins of much lighter colour; at the centre of the root of the caudal a large round black spot; ventral and pectoral rays reddish yellow or pale orange, their membranes transparent whitish.

D 18 or 19/9 or 10, C $16\frac{2}{3}$, A 10/10 or 11, V $1\frac{1}{5}$, P 15, Br. VI.

HABIT.—*Fresh water and estuaries Malayan Peninsula and Islands.*

Fresh water and estuaries Chusan, Celebes, Java, Madura, Sumatra, Burmah, Tenasserim, Bengal, Assam, Coromandel, Philippines.

TOTAL LENGTH: 7 inch.

At Pinang and Singapore this species is less numerous than in Bengal, and in the former localities large individuals are of comparatively rare occurrence. The Malayan individuals agree with the Bengal ones in most of the external characters: the length of the head is $\frac{1}{3}$ of the body, the caudal fin not included; the diameter of the eye is $\frac{1}{5}$ of the length of the head. But the caudal fin is comparatively longer varying from $\frac{1}{4}$ to $\frac{1}{8}$ less than the length of the head; the dorsal and anal spines are longer, the ventral rays reach the first anal spine; the greatest

vertical diameter of the body varies from $\frac{1}{3}$ to somewhat less than $\frac{1}{4}$ of the total length. Individuals taken in Bengal have the caudal fin $\frac{2}{3}$ of the length of the head; the greatest vertical diameter of the body slightly exceeds the length of the head. The colours are slightly different and the number of fin rays are,

D 16 or 17/9 or 10, A 10 or 11/10.

In the Malayan countries the fish is eaten by the poorer classes, who, however, attribute to it neither the medicinal qualities nor the climbing propensities, for which it is famed by the natives of Bengal.

GEN. MACROPODUS, *Lacépède*, 1802.

Velvety teeth in both jaws, with an external series of longer, distant, recurved teeth; margins of infraorbitals and opercles externally smooth; lateral line, when present, interrupted; dorsal and anal rays undivided; dorsal fin of less extent than anal; first ventral and some of the posterior anal rays elongated, filamentous.

MACROPODUS PUGNAX, Cantor.

Plate II. Figs. 1, 2, 3.

Head above and back pale brownish or olive grey, lighter on the opercles, sides and abdomen; from between the eyes along the back 8 to 11 blackish vertical bands, reaching the abdomen; along the sides 5 or 6 longitudinal silvery lines, produced by a silvery dot on each of scale; from the angle of the mouth, through the iris to the termination of the opercle a horizontal black band; lips, chin, and throat blackish blue spreading as a horizontal band over the lower part of the side of the head to the gill-opening; dorsal, caudal and ventral membranes pale reddish hemitransparent; margin of the dorsal and the filamentous anterior ventral ray pale golden or silvery green; anal membrane pale Indian red, lower margin silvery bluish or greenish; rays blackish; pectorals whitish transparent. Iris narrow, golden; the half below the black transversal band carmine; the half above the band golden, and near the orbit dark olive.

D $1/8$ or 9, C $13\frac{2}{2}$, A $2/25$ or 26, V $1/5$, P 13, Br. VI.

HABIT.—*Fresh water, Pinang, Malayan Peninsula.*

TOTAL LENGTH: $3\frac{5}{8}$ inch.

The head is much depressed, and far broader than the body, which is gradually compressed towards the caudal fin. The profile of the

back is slightly arched, the highest part being at the dorsal spine; the abdominal profile is less arched than the former. The length of the head is $\frac{1}{3}$, or slightly more, of the length of the body, the caudal not included; the depth at the occiput $\frac{2}{3}$ of the length of the head. The eyes are prominent, occupying the second fourth, and bordering on the profile. Their distance across the forehead is nearly double the diameter. The mouth is semicircular, moderate; the angle is in front of the orbit. The posterior opening of the nostrils is situated close to the orbit; the anterior is provided with a small fleshy tube. The tongue is free, fleshy and very pointed. Behind the velvety teeth of the upper jaw appear successively three semicircular membranous folds, of which the posterior is papillular on the margin, which thus appears as if studded with a second series of minute teeth. The head is everywhere covered with large rounded scales like the rest of the body, but the slightly protractile jaws are naked; the posterior part of each branch of the lower jaw is covered by a single large oval scale. The greatest vertical diameter of the body, at the dorsal spine, is in some individuals $\frac{3}{4}$ of, in others equal the length of the head. The vertical diameter at the root of the caudal fin varies from $5\frac{1}{2}$ to $\frac{1}{6}$ of the length of the body. The dorsal fin commences a little behind the posterior half of the body; the rays gradually increase towards the fifth, the longest; the extent of the base is from $\frac{1}{8}$ to $\frac{1}{9}$ of the length of the body; the distance from the last ray to the caudal is $\frac{1}{4}$ of the length of the body. The caudal is very broad lanceolate; the two central rays are the longest, in some individuals $\frac{1}{3}$ of the entire length of the fish, but frequently less. The length of the anterior filamentous ventral ray rarely exceeds that of the head. The pectorals are rounded, their length but slightly exceeds $\frac{1}{2}$ of the head. Opposite their posterior half is situated the anus, immediately behind which the anal fin commences. The rays of the latter gradually increase in length to the twenty-third or fourth, which are sometimes elongated beyond the point of the caudal fin. The extent of the scaly base of the anal equals $\frac{1}{2}$ of the length of the body. No lateral line appears, but on the series it would occupy if present, some of the anterior scales have each a central rounded depression, which, however, also appears on single scales nearer the back. Three series lower down, on the posterior half of the sides, commences sometimes a row of similar depressions, which then continue to the caudal

fin. The scales are rather large, higher than long; the anterior margin is straight with 21 striæ, the posterior rounded, ciliate; a line from the gill-opening to the caudal fin contains 32; the greatest vertical diameter presents 10. Of the six branchiostegous rays the upper one is longer and broader than the rest; the fifth and sixth are rounded, setaceous. Œsophagus is voluminous, short, suddenly widening into the rounded capacious stomach. The intestinal canal is doubled upon itself, about $\frac{1}{7}$ of the length of the fish. Neither cæcopyloric appendages nor air-vessel appear. The liver is elongated of a reddish yellow. The skeleton has 28 vertebræ of which 10 are abdominal. The branchial labyrinth (Plate II. Fig. 2.) is still more reduced than it is in *Macropodus viridi-auratus*, Lacép. and almost as simple as in *Spirobranchus capensis*, Cuv. (Cuv. Val. VII. 392, Pls. 200 and 205.) It consists of a single backwards bent lamina, and a very small posterior rudimentary one. At the foot of the hills at Pinang this species is numerous in rivulets. Like the rest of the family it is capable of living for sometime out of water. The Siamese inhabitants with whom this species is a great favourite, keep these fishes in jars with water, where the larva of musquitoes is their food, and denominate them "*Pla kat*,"* i. e. the fighting fish, although they live peaceably together. The real fish however, the exhibition of whose combats is a popular amusement with the Siamese, appears to be a variety of the present species, produced by artificial means, like the varieties of the golden carp of China.

MACROPODUS PUGNAX, VAR.

Plate II. Fig. 4.

Pla kat of the Siamese.

Head above and back dark greenish olive, lighter on the sides, the lower part of which and the abdomen deep blood red; all the scales edged with black; a black longitudinal band from the eye to behind the dorsal fin, a second from the nostrils, through the iris to the root of the caudal; a third from below the eye obliquely downwards to the gill-opening; dorsal membrane silvery greenish brown, with numerous black undulating lines, vertically intersecting the black rays; caudal

* *Pla*, fish; *kat*, a fighter. The Variety is noticed by Lieut. Colonel Jas. Low,

membrane golden green, the rays bright blood red, the fin edged with black; anal membrane bright blood red as far as the posterior 4 or 5 rays, the rest as well as the lower margin silvery light green or sky-blue, the rays black; ventral spine and rays black, the first ray terminating in a silvery filament; the membrane between the first, second and third ray bright blood red, the rest black; branchiostegous rays and their very wide membrane black; pectorals white, transparent. Iris pale reddish golden with a bluish black spot in the centre of the lower half.

The number of fin rays, and other external characters are the same as in the species, but the colours and the length of the dorsal, caudal, anal and ventral fins are individually varying. The branchiostegous membrane is remarkably wide and lax. When the fish is in a state of quiet with the fins at rest, the dull colours present nothing remarkable. But if two are brought within sight of each other, or if one sees its own image in a looking glass, the little creature becomes suddenly excited, the raised fins and the whole body shine with metallic colours of dazzling beauty, while the projected gill membrane, waving like a black frill round the throat, adds something grotesque to the general appearance. In this state it makes repeated darts at its real or reflected antagonist. But both when taken out of each other's sight, instantly become quiet. The description was drawn up in 1840 at Singapore, where a gentleman had been presented with several by the King of Siam. They were kept singly in glasses with water, fed with larvas of musquitoes, and had thus lived for many months. The Siamese are as infatuated with the combats of these fishes as the Malays are with their cock fights, and stake considerable sums, and sometimes their own persons and their families. The license of exhibiting fish fights is farmed, and affords a considerable annual revenue to the King of Siam.

GEN. OSPHROMENUS, (*Commerson*) *Cuvier*, 1829

(OSPHRONEMUS [*Comm.*] *Lacépède*, 1800.)

Differs from *Polyacanthus*, Kuhl and Van Hasselt, by the shorter extent of the dorsal fin, by the more complicated labyrinthform (superbranchial) organ, by the very elongated, setaceous first ventral ray, and by the toothed margin of the infraorbitals. In the young the margin of pre- and interopercle are toothed.

OSPHROMENUS OLFAx, Commerson.

Osphronéme gourami, Lacépède, III. 117, Pl. 3, Fig. 2.

Trichopus goramy, Shaw, IV. 388, Pl. 55.

Trichopus satyrus, Shaw, l. c. 391, Pl. 35?

Osphronemus olfax, Hardwicke : Zool. Journ. Vol. IV. 309.

Osphromenus olfax, Cuvier, R. A. II. 228.

Osphromenus olfax, Cuv. and Val. VII. 377, Pl. 198.

Osphromenus notatus, Kuhl and Van Hasselt. (*Young?*)
Cuv. and Val. VII. 386.

Osphromenus olfax, Swainson, II. 236.

Osphromenus olfax, Richardson : Rep. 1845, 251.

Osphronemus olfax, Bleeker : Verh. Bat. Gen. XXII. 4.

Ikan gorámmi, of the Malays.

Young. Head above and back dark brown or olive, lighter greenish on the sides of the head and body to a little above or below the lateral line; lower parts of the sides of head and body, and abdomen silvery brownish or reddish buff; from the occiput to the caudal 7 to 9 oblique blackish bands; at the root of the pectorals, and in the penultimate lateral band, a little in front of the termination of the anal, a black spot; pectorals and posterior half of ventrals whitish, the rest and the membranes of the other fins closely and minutely dotted with brown; spines and rays brownish grey.

Adult. Head, back and upper part of the sides reddish or greenish dark brown; opercles and lower half of the sides impure yellowish white; lateral bands very indistinct; fins greyish brown, ventrals and pectorals paler than the rest. Iris reddish golden with scattered black spots.

D $\left\{ \begin{array}{l} 11/11, \\ 12/12, \text{ C } 16\frac{1}{2}, \\ 13/12, \end{array} \right.$ A $\left\{ \begin{array}{l} 9/21, \\ 10/20, \\ 11/19, \\ 12/20, \end{array} \right.$ V $1\frac{5}{5}$, P 15, Br. VI.

HABIT.—(*Naturalised*) Fresh water, Pinang, Malacca.

China, Java, Madura. (*Naturalised*) Isle of France, Cayenne.

TOTAL LENGTH : 1 foot 6 inch.

The very young individuals differ from the adult not only in colours, but also in having the head more elongated: its length being from $2\frac{1}{2}$ to $2\frac{2}{3}$ in that of the body, the caudal not included. In the adult the head is $3\frac{1}{4}$ in the body alone, the toothed margin of the pre- and interopercle becomes smooth, and the first ventral ray is comparatively

shorter than in the young, in which it sometimes reaches the caudal fin. Both at Pinang and at Malacca this fish has been successfully naturalised though in the former place it is not numerous, but confined to a few ponds. They become tame so as to appear on the approach of their feeder, and will rise to flies, beetles, and certain flowers, particularly a large *Hibiscus*. Among themselves they are pugnacious. Many years ago several living ones were imported, and placed in a tank in the Calcutta Botanical Gardens, where they appeared to thrive. Little care, however, having been bestowed on their preservation, but a solitary one survived in 1841.

GENUS. *TRICHOPODUS*, Lacépède, 1800.

Scarcely differs from *Osphromenus* but by a more convex forehead, and by a dorsal fin of less extent.*

TRICHOPODUS TRICHOPTERUS, (Pallas.)

Plate II. Fig. 5. (Head.)

Sparus, Koelreuter. Nov. Comm. Petrop. IX. P. 452, Pl. 9,

Labrus trichopterus, Pallas: Spicil, Fasc. 8, 45. [Fig. 1.

Labrus trichopterus, Linné: Syst. 1286.

Trichopode trichoptère, Lacépède, III. 129.

Trichogaster trichopterus, Bloch-Schneider, Pl. 295, Fig. 2.

Trichopus pallasii, Shaw, IV. 392.

Trichopus trichopterus, { Cuvier, R. A. II. 229 (1°)
 { Cuv. and Val. VII. 388, Pl. 199.

Trichopus maculatus, Swainson, II. 235.

Trichopus trichopterus, Bleeker: Verh. Batav. Gen. XXII. 4.

Head above, back and sides to a little below the lateral line brownish olive, each scale of the latter with a sky-blue or verdigris rectangular spot; cheeks and opercles silvery light blue with lilac reflection; sides below the lateral line silvery light blue, abdomen silvery reddish lilac, all the scales iridescent, edged with reddish brown forming an irregular network; from the angle of the mouth through the iris, below the silvery lateral line to the root of the caudal a black zig-zag band, widening at the termination into a large spot, and in some individuals a similar in the centre part of the band; dorsal spines and rays whitish grey, their membrane dark grey with numerous white rounded spots;

* Although to these differences may be added a less complicated labyrinthform organ, and five branchiostegous rays, the genus rests but on slender characters.

caudal membrane and rays like the dorsal; anal spines carmine, their membrane and rays whitish, each ray terminating in a short silvery filament; ventral spine, membrane and four rays whitish, the anterior elongated ray carmine; pectoral pale carmine at the root, the rest white transparent. Iris narrow golden round the pupil, lower half sky-blue, upper half above the black bar golden brown.

$$D \begin{cases} 6/9, \\ 7/8, \\ 7/9, \\ 7/10, \end{cases} C \ 16\frac{2}{2}, A \begin{cases} 10/34, \\ 12/29, \\ 13/29, \\ 14/28, \end{cases} V \ 1/5, P \ 9, Br. \ V.$$

HABIT.—*Fresh water, Pinang, Malayan Peninsula.*

Moluccas, Madura, Java.

TOTAL LENGTH: $4\frac{2}{8}$ inch.

Like all the species of this family, the present is liable to considerable individual variations of colours, number of fin rays and proportions. Thus M. M. Cuvier and Valenciennes count:

D 5/8, C 16, A 11/35 or 36, V 5, P 14, Br. IV.

and ask with doubt if the species be different which Bloch characterises:

D 7/7, C 16, A 11/33, V 3, P 10, Br. IV.

With regard to the number of branchiostegous rays, it is *five* on each side; the superior is the longest and broadest, the rest gradually decrease in length and breadth. They are difficult to count as the second is completely hid under the first, and the fourth and fifth are very thin, setaceous, and may thus easily be mistaken for a single one. The ventral spine is very short, and thick, but so firmly adhering to the root of the first elongated ray, that it easily escapes observation. The short, gradually decreasing 2d, 3d, 4th, and 5th ray are divided, but the latter is frequently undivided. The length of the head varies in individuals of equal length from $3\frac{1}{2}$ to $3\frac{1}{3}$ in that the body, the caudal fin not included. The latter is a little shorter than the head, the vertical diameter of which, at the occiput, equals the length. The diameter of the eyes is $3\frac{1}{2}$ times in the length of the head; their distance across the forehead is $1\frac{1}{2}$ diameter. The anterior smaller opening of the nostrils has a short membranous tube. The mouth is small and rendered more so as the lower jaw forms a much smaller half circle than the upper. Both have a narrow band of velvety teeth. The tongue is small, fleshy, and its margin completely adhering to the floor of the mouth. The greatest vertical diameter of the body at the fourth dorsal spine varies from $2\frac{1}{2}$ to $2\frac{1}{3}$ in the length of the body, the

caudal fin not included. The distance from the last dorsal fin to the upper caudal appears to be constantly equal the length of the head. The longest dorsal, caudal and anal rays seldom exceed the length of the head, but are frequently a little shorter. The first ventral ray in some reaches the termination of the anal, in others beyond that of the caudal. The anal rays are either all undivided or a few of the posterior are divided, and the last connected to the caudal. The length of the pectoral is $\frac{2}{3}$ of that of the head. The lateral line consists on each scale of a central transversal tube, above and below which appears a short elongated furrow. A straight line from the gill-opening to the root of the caudal contains from 44 to 46 scales; a vertical at the deepest part of the body from 20 to 25. The lower margin of the infraorbitals and of the preopercle are closely and rather strongly toothed. The stomach is rounded, contracted in the middle, and as well as the spirally twisted intestines almost entirely hid by the large light brown liver. There are two rather long cœcopyloric appendages. The gall-bladder is rather large, the spleen small. Between the vertebral column and the abdominal cavity appears a very short air-vessel, silvery like the peritoneum, but much thinner. The intestinal canal is nearly double the length of the fish. The labyrinth-form organ (Plate II. Fig. 5,) is less complicated than in *Osphromenus olfax*: it consists of three laminæ of which the central is the largest, entirely hiding the third, the inner one. Like the rest of the family, this species is capable of sustaining life out of water, particularly if kept in wetted fresh leaves, or occasionally sprinkled with water. At Pinang it is numerous in streamlets and ponds, where it is eaten by the poorest classes. The exquisite beauty of the metallic iridescent colours make these fishes acquisitions in garden tanks. Like *Osphromenus olfax* they are very pugnacious among themselves.

A second species of *Trichopodus* has been discovered by Mr. Campbell, Superintendent of Darjeeling, in the rivers at the Sikkim passes on the northern frontier of Bengal. An incorrect and defective description and figure have been published by Mr. McClelland, who imagining the fish to belong to the Family of *Chætodontidæ*, and the genus to be new, denominated it *Ctenops nobilis*.*

* Cal. Journ. Nat. Hist. V. 281, Pl. 21, Fig. 1.

GEN. OPHIOCEPHALUS, *Bloch-Schneider*, 1801.

With labyrinth-form superbranchial organ; fins without spines, the ventrals commencing with a divided or undivided, jointed ray; dorsal occupying nearly the whole length of the back; caudal rounded; lateral line uninterrupted; head depressed, covered with polygonal scales; both jaws, vomer and palatal bones with velvety, or card-like teeth, among which generally some longer than the rest; body elongated, almost cylindrical. Branchiostegous rays five.

OPHIOCEPHALUS STRIATUS, Bloch.

Ophicephalus striatus, Bloch, Pl. 359.

Ophicephalus wrahl, Lacépède, III. 552.

Ophicephalus striatus, Shaw, IV. 530.

Russell, CLXII. Muttah.

Ophicephalus wrahl? Buch. Ham. ("Sol.") 60, 367, Pl. 31, Fig. 17.

Ophicephalus chena, Buch. Ham. (*Var.*) 62, 367.

Ophicephalus striatus, Cuv. R. A. II. 230 (°)

Ophicephalus striatus, Cuv. and Val. VII. 417, Pl. 202.

Ophicephalus striatus, Swainson, II. 237.

Ophicephalus wrahl, McClelland, Cal. Journ. Nat. Hist. II. 575.

Ophicephalus striatus, Jerdon. Madr. Journ, XV. 146.

Ikan harúan of the Malays.

Head above and back greenish olive with indistinct clouded black spots; cheeks, opercles and sides to a little beneath the lateral line lighter with metallic lustre; throat, abdomen and lower part of the head and sides white; from the angle of the mouth a short metallic-olive oblique line, and on the throat a few distant dark spots; lower part of sides with a number of backwards directed oblique, blackish lines, the intervals between which pale salmon-coloured; dorsal membrane minutely dotted with brown so as to produce oblique brownish lines, between which, at the base, appear some rounded whitish spots; caudal pale brownish with indistinct light concentric lines; upper half of anal white with oblique brown lines; lower half blackish brown; ventrals white with indistinct blackish spots; pectorals transparent whitish, minutely dotted with brown along the margins of the rays.

Iris amber-coloured, orange or reddish golden round the pupil, the rest golden olive, clouded with black.

D 41, 42 or 43, C $14\frac{1}{7}$, A 25, 26 or 27, V 6, P 16 or 17, Br. V.

HABIT.—*Freshwater and estuaries, Malayan Peninsula and Islands, Manilla, Celebes, Tenasserim, Rangoon, Irawaddy, Ganges, Bengal, Barrampootr, Goalparah, Coromandel, Malabar, Hindostan.*

TOTAL LENGTH: 2 feet.

The length of the head is from $3\frac{1}{2}$ to $3\frac{2}{3}$ in the total; (it is $\frac{1}{3}$ of the distance from the muzzle to the last dorsal ray;) the height at the occiput is $2\frac{1}{3}$ in the length. The horizontal diameter of the eyes slightly exceeds $\frac{1}{3}$ of the length of the head; their distance across the forehead equals two such diameters. The vertical diameter at the first dorsal ray is $\frac{1}{2}$ of the length of the head. The anterior part of the lateral line gradually descends towards the commencement of the second third of the dorsal, from whence it proceeds straight to the root of the caudal. The line is marked on each scale by a short central tube, which bifurcates. The number of component scales vary from 60 to 62. An oblique series from the anus consists of 18 to 20 scales. In these and other characters the Malayan individuals exactly correspond to *O. striatus*, Bloch, as described by M. M. Cuvier and Valenciennes. Individuals of *O. wrahl?* apud Buchanan Hamilton, (*Sol.*) taken in the vicinity of Calcutta, differ but slightly in colours, and in presenting from 43 to 46 dorsal, and from 26 to 28 anal rays. *O. chena*, Buch. Ham. offers the same number of rays as the latter, and appears but to be another variety, probably as Buchanan suggests, the identical one which Russell figured No. CLXII. *Muttah*. In the Malayan countries, the fish is as numerous as in Bengal, and it is also there eaten by the natives.

FAM. MUGILISIDÆ.

GEN. MUGIL, (*Artedi.*) Linné, 1748.

Body nearly cylindrical, covered with large scales; two dorsal fins widely separated: the anterior spinous, the posterior with one or two spines, the rest rays; ventrals behind the pectorals; centre of the lower jaw with an elongated angular point, corresponding to a notch in the upper jaw; teeth minute. Branchiostegous rays six.

MUGIL PARMATUS, Cantor.

Young? Head above and back pale brownish olive; cheeks and upper half of the sides silvery greenish grey; lower half of the sides and abdomen silvery white; on the upper part of preopercle a triangular bluish black spot, behind which an indistinct amber-coloured spot; the rest of preopercle and opercle pale silvery blue, faintly vermiculated with brown; dorsal and caudal membranes pale grey, minutely dotted with brown; the rest of the fins white. Iris silvery grey.

D 4—1/8, C 14 $\frac{1}{2}$, A 3/9, V 1/5, P 14, Br. VI.

HABIT.—*Sea of Pinang.*

TOTAL LENGTH: 4 $\frac{6}{8}$ inch.

The length of the head is 4 $\frac{2}{3}$ in the total, or $\frac{1}{4}$ of the length of the body, the caudal not included; the height at the occiput $\frac{4}{5}$ of the length of the head. The orbit occupies the second fourth of the head; the eye is covered in front and behind by a crescent-shaped adipose lobe; the distance of the orbits across the forehead equals 1 $\frac{1}{2}$ diameters. On the anterior margin of the infraorbital bone appears a broad angular incision, which receives the angle of the lips; the inferior margin is truncated, minutely toothed; near the upper margin of the infraorbital, below the two small openings of the nostrils, appear two minute pores. The mouth is very small; both jaws have excessively minute setaceous teeth, scarcely projecting beyond the cartilaginous lips. The greatest vertical diameter of the body, in front of the anterior dorsal spine, equals the length of the head; that in front of the caudal fin is $\frac{1}{2}$ of the former. A straight line from the gill-opening to the caudal contains 27 scales, an oblique series 10. The anterior dorsal spine is strong: its length is a little less than $\frac{3}{4}$ of that of the head; no elongated triangular scale appears at the base of the anterior dorsal, nor of the pectoral. The second dorsal, the caudal and anal fins are half covered with very small scales. The first anal spine is excessively minute. The two central rays of the caudal are but very slightly shorter than the rest. A single individual was observed at Pinang in April 1844.

The present greatly resembles *M. grandisquamis*, Cuv. and Val. (XI. 103), an African species, remarkable for the great size of its scales. The latter differs in the following particulars. The greatest height is nearly $\frac{1}{3}$ of the total length; at the occiput the height is $\frac{2}{3}$ of the

length of the head; at the root of the caudal it is one half of the greatest. It is described as having no teeth.

MUGIL MACROLEPIDOTUS, Rüppell.

Muge christian, Quoy et Gaimard : Voy. de Freycinet.

Mugil macrolepidotus, Rüppell : Atlas, Fische, p. 140, Taf. 32, Fig. 2.

Mugil macrolepidotus, Cuv. and Val. XI. 134.

Mugil macrolepidotus, Richardson : Report, 1845, 249.

Young. Head above and back pale bluish green; lighter, silvery, on the sides of the head and abdomen; opercle steel blue; on the sides four parallel pale blackish lines; dorsal, caudal, and anal spines, rays, and membranes minutely dotted with black; on the dorsals and anal so closely as to give the marginal half a black appearance; ventrals white, posterior half of the three anterior rays minutely dotted with black; upper ten pectoral rays black, the rest white. Iris silvery.

D 4—1/8, C 14 $\frac{2}{7}$, A 3/8, V 1/5, P 16, Br. VI.

HABIT.—*Sea of Pinang.*

Waigiou, Rawak, Borabora, Vanikolo isles, Malabar, Red Sea, China Seas?

TOTAL LENGTH: 5 inch.

The length of the head is $4\frac{1}{2}$ in the total; the height at occiput $\frac{2}{3}$ of the length. The diameter of the eyes is $3\frac{1}{2}$ in the length of the head; their distance across the forehead equals two diameters. The anterior margin of the infraorbital bone is arched, so as to receive the angle of the lips, and as well as the inferior truncated margin finely toothed. The young has no perceptible teeth; M. M. Cuvier and Valenciennes describe them as short and fine in the adult. The posterior margin of the preopercle has three deep indentations. The vertical diameter in front of the first dorsal spine slightly exceeds $\frac{1}{4}$ of the total length; that in front of the caudal fin is less than one half of the former. A straight line between the gill-opening and the root of the caudal contains 29 scales; an oblique series in front of the anterior dorsal fin 9. The first dorsal spine is scarcely $\frac{1}{2}$ of the length of the head, and less strong than in *M. parmatius*. A single individual was observed at Pinang in August, 1843.

MUGIL CEPHALOTUS, Cuv. and Val.

Mugil öur, Forskål, Consp. p. XIV. No. 109, Var. 8?

Mugil cephalus, Russell CLXXX. Bontah.

Mugil cephalus? (Sole bhanggan), Buchan. Ham. p. 219, 381.

Bontah, Russell. (SYN.—Mugil oür, Forsk.) Cuvier R. A.
II. p. 232 (1).

Mugil cephalotus, Cuv. and Val. (SYN.—Mugil oür, Forskål)
XI. 110.

Russel II. CLXXX. Rüppel: Neue Wirbelth. Fische, p. 131.

Mugil cephalotus, Bleeker, Verh. Bat. Gen. XXII. 5.

Júmpul of the Malays.

Head above and back lead-coloured tinged with green, lighter silvery on the sides of the head and body as far as the upper margin of the pectoral fins; all the parts below dull silvery white; on the sides five to seven parallel, dark grey longitudinal bands; anterior dorsal fin light bluish grey; posterior and caudal membrane dark grey, rays lighter; anal and ventrals white; pectorals outside white, hemitransparent, inside with a large oblique blackish spot on the anterior half. Iris silvery or mother-of-pearl round the pupil; the rest blackish brown.

D 4—1/8, C/14 $\frac{3}{3}$, A 3/9, V 1/5, P 17, Br. VI.

[Isles.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore, Lancary Chusan, Macao, Madeira, Coromandel, Bay of Bengal, Gangetic estuaries, Malabar.*

TOTAL LENGTH: 2 ft.

The head is much depressed, broad oval, the muzzle being about half the breadth of the occiput. The upper surface is less transversely arched than the lower; both surfaces where they join, form a blunt ridge from behind the eye to the short triangular membranous point in which the opercle terminates. The eye is situated in front of the ridge, occupying the third eighth of the head; its transversal diameter being $\frac{1}{8}$ of the length of the head, which is $4\frac{1}{2}$ times in the total, or $\frac{1}{4}$ of the body, the caudal fin not included. The distance between the eyes across the forehead equals $3\frac{3}{4}$ diameters. The vertical diameter of the head between the eyes is about $\frac{1}{3}$ of the length: at the occiput it is $\frac{1}{2}$. The openings of the nostrils are situated a little above the level of the orbit, along the superior margin of the infraorbital; the posterior, the larger, is transversely oval; the anterior is circular. The infraorbital bone is broad triangular, with

the rounded, truncated apex downwards; the latter, as well as the backwards arched anterior margin, is finely but distinctly toothed, and naked, but the rest of the external surface is covered with small scales. The adipose membrane covering the circumference of the eye is of a whitish grey. No such series of pores appear on the lower half of the membrane, as M. Rüppell has observed in *Mugil oür*, Forskål (not apud Cuvier and Val.), nor are there any pores under the lower jaw. The lower half of the posterior margin of the preopercle has two large, a little obliquely upwards-directed indentations, and in some the upper half of the margin has two similar ones. *M. oür* as well as *M. cephalus* are according to M. Rüppell distinguished by six pores beneath the lower jaw, and by three not very distinct oblique indentations in the lower margin of the preoperculum. The mouth is horizontal, the angle is opposite the anterior opening of the nostril; the upper jaw projects beyond the lower. The upper mandible is flattened, broad in the centre, tapering towards the angles of the mouth; in the centre is a very small notch. In the upper lip appears a single series of very minute teeth. The symphysis of the lower jaw forms a tubercle under which appears a notch deeper than that of the centre of the upper mandible. The lower lip is more fleshy than the upper, and the margin is bent downwards, so as to form on each side a furrow proceeding from the notch under the symphysis to the angle of the mouth. The teeth of the lower jaw are so excessively minute, few, and distant, that even in large individuals they are imperceptible to the touch, and can only be seen through a lens. In smaller individuals these teeth are absent, or at least confined within the half transparent mandibles, and appear like short seta, bent with the lip, but not projecting beyond it. The tongue is fleshy, broad at the root, narrower, rounded at the apex, and raised in a keel in the centre. Along the margin which is fixed to the floor of the mouth, appears a series of rounded or oval patches of velvety teeth. At the root of the central keel is an elongated patch, and close behind the apex two smaller ones of velvety teeth. On each side of the vomer is raised into a tubercle, carrying a transversely placed linear patch of similar teeth. Every part of the head is covered with scales, of which those of the opercle are very large, but in young individuals they are so thin as to make the silvery opercle appear scaleless. The vertical diameter in front of the anterior dorsal spine

equals the length of the head minus the diameter of the eye. The anterior dorsal spine equals the distance from the muzzle to the posterior margin of the orbit, or about $\frac{1}{2}$ of the last mentioned vertical diameter. The anterior dorsal fin commences in the centre of the distance between the muzzle and the root of the caudal. The extent of the base equals the length of the anterior spine; from its centre commences an elongated, triangular scale, projecting midway behind the very slender fourth spine, the length of which is $\frac{1}{2}$ of the preceding three. The distance between the anterior and posterior dorsals equals $\frac{2}{3}$ of the length of the head, the latter fin commencing opposite the centre of the anal, much nearer the caudal than the anterior dorsal. The anterior ray equals $\frac{1}{2}$ the length of the head. The distance between the posterior ray and the root of the caudal equals the length of the anterior dorsal spine. The posterior margin of the caudal fin is but slightly furcated, the inferior lobe is a little larger than the upper. The anal fin commences about halfway between the termination of the ventrals and the root of the caudal fin. Its height equals, its extent slightly exceeds the second dorsal. The two anterior spines are so completely covered by scales, that they escaped the observation of Russell, whose figure (CLXXX.) represents the third much too long: it exceeds but slightly $\frac{1}{2}$ of the anterior ray. The length of the pectoral fin is $7\frac{1}{3}$ in the total, or nearly equal that of the caudal. Above the root of the pectoral appears no trace of an elongated triangular scale, as in some other species, but in the axilla, hidden by the fin, are two elongated oval scales, much smaller than the rest. The ventral fins are a little shorter than the pectorals; the spine is strong and but slightly shorter than the anterior dorsal. At the base of each fin appears an elongated triangular scale, and a similar, but shorter and broader between the two fins; the anterior half of the fifth ray is attached to the abdomen by a membrane. A straight line between the gill-opening and the root of the caudal fin contains from 33 to 35 scales, an oblique series in front of the anterior dorsal 11 or 12. The scales are very large, nearly as broad as long; the anterior margin is straight, but with from 2 to 6 crenulations, produced by a number of radiating lines, varying in number from 3 to 7. The posterior margin is rounded and with excessively minute points, the termination of a very fine concentric net-work on the exposed

surface. Each scale is marked by a fine central line, horizontal in most, but pointing obliquely downwards on the scales immediately beneath the root of the pectoral fins.

The stomach is composed of two portions: the cardiac into which the short capacious œsophagus opens, terminates in an elongated cylindrical fundus; the pyloric portion is shorter, globular like a large button, and very thick, gizzard-like. The cavity is very small and presents a few coarse longitudinal folds. In several examined, it contained some mud, mixed with green mucus. Pylorus is surrounded by five short but capacious cœcopyloric appendages. The intestinal canal, about 7 times the length of the fish, is folded several times upon itself and firmly enveloped in fat. The gall is rather large, ovoid with a short duct opening close to Pylorus. The liver is moderate, resting across the stomach, with several lobes, of which the longest is attached to Duodenum. The spleen is small, elongated, completely hidden by the fat between the folds of the intestines. The abdominal surface of Peritoneum is black, the opposite silvery. The air-vessel is large, elongated, its parietes very thin, pearl-coloured. At Pinang this species occurs, though not numerously, at all seasons, and when newly taken it is highly valued for its excellent flavour.

The present is the fish supposed by Russell to be *Mugil cephalus*, Linné, (Vol. II. p. 64.) The figure, (CLXXX. *Bontah*,) among other inaccuracies represents the mouth without teeth, and the anal fin with a single, too long spine. The latter, as well as the margins of the scales being entire, (as they in reality appear to the naked eye,) induced Buchanan Hamilton to consider the individuals which he obtained from the estuaries of the Ganges, to be a distinct species, and also he overlooked the minute teeth in the lips. M. M. Cuvier and Valenciennes (T. XI.) unite both under the denomination of *M. cephalotus*. They doubt, however, without reason, the correctness of Russell's omitting to figure, and Buchanan to mention, any elongated triangular scale above the pectoral fins, and they believe that the fish is identical with *Mugil oür*, Forskål, (*Consp.* p. XIV. No. 109, *Var.* and characterised: "Labio utroque ciliato, inferiori unicarinato, oculis pinguedine fere obtectis, operculo macula p. p. oblonga obliqua.") Dr. Rüppell, (*Neue Wirbelth*, &c. *Fische*, p. 131,) observes that if Russell's description of "*Bontah*," as being "without teeth" is correct, the

fish cannot be identical with *M. oür*, the microscopical teeth of which Forskål expresses by the word "ciliato." It is to be regretted that Dr. Rüppell did not communicate a more detailed description of the fish from the Red Sea, which is most likely Forskål's species, for although Russell happens to be incorrect, the fish he described presents neither the six pores under the lower jaw, nor the arched series of pores in the adipose membrane, covering the lower part of the eye, which Dr. Rüppell points out as characters distinguishing *M. öur*. It is therefore impossible with certainty to determine if the latter is identical with the present species.

MUGIL CUNNESIUS, Cuv. and Val.

Russell CLXXXI. Kunnesee.

Mugil kunnesee, Cuvier R. A. II. 232 (1.)

Mugil cunnesius, Cuv. and Val. XI. 114.

Mugil cunnesius, Rüppell: Neue Wirbelth. Fische, 131.

Young. Head above and back silvery bluish green, lighter, minutely dotted with black on the upper half of the sides; lower half and abdomen silvery white; sides and abdomen with parallel silvery lines, produced by a short line on each scale; cheeks and opercles shining silvery, the latter with steel-blue reflections; fin-membranes white, those of the dorsals and caudal minutely dotted with black, particularly towards their margins, so as to make them appear blackish; in some a black spot at the root of the upper pectoral ray, continued in the axilla as a blackish line. Iris silvery round the pupil, the rest dotted with black.

D 4—1/8, C 14 $\frac{3}{4}$, A 3/9, V 1/5, P 16 or 17, Br. VI.

HABIT.—*Sea of Pinang, Malayan Peninsula, Singapore.*

Moluccas, Bay of Bengal, Coromandel, Malabar, Red Sea.

TOTAL LENGTH: 6 $\frac{1}{2}$ inch.

The length of the head is $\frac{1}{4}$ of the body, not including the caudal fin. The height at the occiput is about $\frac{3}{4}$ of the length of the head. The eye occupies the second fourth of the head; the diameter, not including the adipose covering, is $\frac{1}{3}$ of the head; but the diameter of the orbit is $\frac{1}{4}$ of the head; the distance across the forehead is $1\frac{1}{2}$ diameter. The infraorbital is triangular, with the apex truncated, slightly rounded and finely toothed; the anterior margin is nearly straight, neither toothed nor notched. The anterior opening of the nostril is

minute, circular; the posterior a little larger, transversely oval, both situated along the upper margin of the infraorbital. The mouth is small, the lower jaw but little shorter than the upper; the angle is situated opposite the anterior opening of the nostril. The notch of the upper lip corresponds to the tubercle of the lower, which is notched underneath. There are no teeth perceptible in the lips. On each side of the vomer appears a transversal tubercle. In the young the opercles appear to be scaleless. The vertical diameter in front of the first dorsal spine equals the length of the head. A straight line from the gill-opening to the root of the caudal fin contains 42 or 43 scales; an oblique in front of the anterior dorsal fin 13.

Each scale is marked by a central line, horizontal in most, but almost vertical in those immediately below and in front of the pectoral fins. The third dorsal spine is situated at equal distance from the muzzle and the root of the caudal fin. The length of this, as well as of the two preceding spines, exceeds $\frac{1}{2}$ of the vertical diameter of the body beneath them, and it also slightly exceeds the extent of the base of the fin itself. The fourth spine is about $\frac{1}{2}$ of the preceding three. On each side of the base is an elongated scale. The second dorsal fin commences at equal distance from the first dorsal spine and the root of the caudal, opposite the third anal ray; the base nearly equals the length of the first ray. The caudal fin is slightly lunated: the length of the first and fourteenth ray is about $\frac{1}{3}$ of the total length. The length of the pectoral fins is $5\frac{1}{2}$ times in the total; above the root of each appears an elongated scale, formed like a knife-blade with the back towards the upper margin of the fin; its length is nearly $\frac{1}{2}$ of that of the fin. At Pinang young individuals are numerous at all seasons.

MUGIL BORBONICUS, Cuv. and Val.

Mugil borbonicus, Cuv. and Val. XI. 113.

Young. Head above and back bluish green; lighter silvery on the upper half of the sides; lower half abdomen and cheeks silvery white; opercles shining silvery; anterior dorsal fin-membrane transparent minutely dotted with black; first spine blackish; posterior dorsal, caudal, anal and pectoral pale yellow, minutely dotted with black; spine and upper half of the first ray of second dorsal, and the upper, lower, and posterior broad margin of caudal black; at the root of the upper pectoral ray a black spot continued over the anterior half of the

inside of the pectoral ; ventrals white. Iris silvery round the pupil, blackish green towards the orbit.

D 4— $1/8$, C $14\frac{5}{8}$, A $3/9$, V $1/5$, P 17, Br. VI.

HABIT.—*Pinang River.*

Bourbon.

TOTAL LENGTH : 6 inch.

The length of the head is $\frac{1}{4}$ of the body, the caudal fin not included ; the height at occiput $\frac{3}{4}$ of the length. The eye occupies the second fourth of the head ; the diameter of the orbit is $\frac{1}{4}$ of the length of the head ; the distance between the eyes across the forehead is $1\frac{1}{3}$ diameter. The infraorbital is triangular, covered with small scales, and with three pores placed obliquely in the middle of the external surface ; the anterior margin is finely toothed, and slightly arched, but becomes a little concave towards the truncated, finely-toothed apex. The superior margin is somewhat angular in the centre, on each side of which appear the openings of the nostrils. The mouth is small, transversal ; the angle is situated opposite the posterior opening of the nostril ; the lower jaw is but slightly shorter than the upper. There are no visible teeth in the lips ; the lower has in the centre a strong tubercle which in front and beneath is deeply furrowed. On each side of the vomer appears a strong transversal ridge. Under each branch of the lower jaw appear three pores. The preopercle is covered with large very thin scales, and has a long transversal incision in the posterior margin, near the angle ; the opercle and subopercle are apparently without scales, and brilliantly shining with silver. Nearly all the scales of the occiput are divided lengthwise by a shallow furrow, which on the scales of the body becomes a short longitudinal line. But the scales immediately below the pectoral fin are each marked near the root by a short vertical line. A longitudinal series between the gill-opening and the root of the caudal consists of 39 scales ; an oblique in front of the anterior dorsal fin of 14. The vertical diameter in the latter place is $4\frac{1}{2}$ of the total length. The length of the three anterior dorsal spines is about $\frac{1}{2}$ of the length of the head, and equals the extent of the fin itself ; the fourth spine slightly exceeds $\frac{1}{2}$ of the length of the preceding three. At the base appears an elongated scale, extending to the posterior margin of the fin. The second dorsal spine is situated in the centre between the muzzle and the root of the caudal fin. The pos-

terior dorsal fin is situated at equal distance from the anterior and from the root of the caudal, and it commences opposite the anterior anal ray. The upper margin is falcated; the eighth ray is a little longer than the preceding. The extent of the fin equals that of the anterior dorsal. The posterior margin of the caudal is lunated. The anal fin is nearly triangular, but that the posterior ray slightly exceeds the preceding; the third spine is $\frac{1}{2}$ the length of the anterior ray. The length of the pointed, slightly falcated, pectoral fin is $\frac{1}{5}$ less than the length of the head; above the superior margin appears an elongated, knife-blade-like scale, $\frac{1}{2}$ the length of the fin. The ventral fins commence opposite the posterior half of the pectorals; their length equals $\frac{1}{2}$ of that of the head. The elongated scale above the root extends to the margin of the membrane which connects the anterior half of the fifth ray to the abdomen. The elongated scale between the fins is broader and projects far behind the latter connecting membrane.

A single young individual was obtained from a part of the Pinang River, (Sungei Pinang,) where the water is fresh.

SUB FAM. ATHERINOINÆ.

GEN. ATHERINA, (*Artedi*,) *Linné*, 1766.

Body elongated; two widely separated dorsals; ventrals behind the pectorals; upper jaw protractile; minute teeth in both jaws; in some species also on the vomer, palatals and pterygoids; each side with a broad silvery band. Branchiostegous rays six.

ATHERINA FORSKÅLI, Rüppell.

Atherina hepsetus, Forskål, 69, No. 101?

Atherina forskåli, Rüppell: Neuc Wirbelth, Fische: 132,
Tab. 33, Fig. 1.

Head above, back and upper third of the sides pale sea green, dotted with black; from the axilla to the caudal a light blue longitudinal line, under which a pale yellowish, bordered beneath by a broad shining silvery band; muzzle and lips blackish; cheeks and opercles shining silvery, upper half of the latter steel-blue; throat and abdomen silvery white; fins hyaline, margins of spines and rays of the dorsals, caudal and pectorals minutely dotted with black; posterior margin of caudal blackish. Iris silvery; above the pupil a transverse bluish black spot.

D 5—1/9 or 10, C 17 $\frac{2}{5}$, A 1/13, V 1/5, P 15, Br. VI.

HABIT.—*Sea of Pinang.*

Red Sea.

TOTAL LENGTH : $3\frac{6}{8}$ inch.

The length of the head is $3\frac{4}{5}$ in the total, measured to the centre of the posterior margin of the caudal. On each side of the flattened vertex, where the opercle joins, appears a longitudinal furrow containing two or three pores. Three or four such appear on the infraorbitals, several beneath the nostrils, and three beneath each branch of the lower jaw. The diameter of the eye is $2\frac{1}{2}$ in the length of the head. At the lower part of the ascending margin of the preopercle, near the angle, is a deep incision. In both jaws, on the vomer, palatals and pterygoids appear bands of velvety teeth. The vertical diameter at the ventrals is $5\frac{1}{3}$ in the total length. The anterior dorsal fin commences a little behind the centre of the back ; the four first rays are placed close together ; the fifth is somewhat removed from the fourth. The body is covered with seven longitudinal series of rather large scales ; the third series from above carries the lateral line, which consists of a minute notch on the posterior margin of each scale. The anterior 7 or 8 scales of the series appear to have no such notch, so that the lateral line appears to commence on the ninth scale. The pectorals are triangular, a little downwards pointed ; their length slightly exceeds $\frac{1}{2}$ of the total length. The last ray of the second dorsal, and of the anal fin is a little elongated. Two individuals observed at Pinang in July 1843 and April 1845, differ from Dr. Rüppell's description in having five instead of six spines in the anterior dorsal fin. The smaller, $2\frac{4}{8}$ inches in length, is of a more elongated form, its vertical diameter at the ventrals being $\frac{1}{6}$ of the total length. It is also distinguished by having on the vertex a small raised triangular space, resembling an escutcheon, with the point between the orbits. The latter ('*ecusson*'), is described by M. M. Cuvier and Valenciennes as a character distinguishing *Atherina lacunosa*, Forster. As both individuals examined at Pinang present similar pores, and the characteristic incision of the margin of the preopercle, neither of which characters are noted in the description of *A. lacunosa*, their identity with *A. forskali* cannot be doubted.

FAM. SCOMBROIDÆ.

GEN. SCOMBER (*Artedi*) Linné, 1748.

Anterior dorsal fin separated by a considerable interval from the second, the posterior part of which as well as of the anal fin, forms five spurious fins; on each side of the tail two small crests, the one above the other; body fusiform with small smooth scales. Branchiostegous rays 7.

SCOMBER MICROLEPIDOTUS, Rüppell.

Scomber microlepidotus, Rüppell: *Neue Wirbelth. Fische*, p. 38,
Taf. 11, Fig. 2.

Head above, back and sides as far as the lateral line intense steel-blue, after death with three irregular series of black spots; sides of the occiput and of the body immediately beneath the lateral line silvery light blue; lower part of the sides, abdomen, and sides of the head shining silvery, immediately behind the angle of the mouth a black triangular spot; membrane of anterior dorsal transparent, scantily dotted with brown along the spines; second dorsal, caudal, anal and the spurious fins pale yellow; the dorsal spurious fins and the caudal with black margins; ventrals and pectorals whitish, the latter with a blackish line along the root. Iris silvery round the pupil, the rest bluish black.

D 9—12—V, C $17\frac{6}{8}$, A $1/11$ —V, V $1/5$, P 18, Br. VII.

HABIT.—*Sea of Pinang.*

Massaua, (Red Sea.)

TOTAL LENGTH: 5 inch.

The length of the head is $3\frac{1}{2}$ in the total. The diameter of the orbit is $3\frac{1}{2}$ in the length of the head; the distance between the eyes across the forehead is $\frac{2}{3}$ of the diameter. The anterior and posterior thirds of the eye are covered by an adipose crescent-shaped membrane, leaving a central, lanceolate space open. A single series of minute, yet visible teeth, appear in both jaws. The cavity of the mouth is whitish, minutely dotted with black; the anterior part of the tongue is flattened, rounded, and closely dotted with black, the posterior part is a narrow linear crest, covered by a series of small rounded spots of velvety teeth. The sides of the head are scaleless, except the cheeks, or the anterior half of the preopercle, which as well as the space below

the pectoral fins are covered with scales, larger than the very small ones of the body. Along the lower margin of the preopercle, appear some rather indistinct radiating lines. The vertical diameter in front of the anterior dorsal is $4\frac{1}{2}$ in the total length. The first spine of the anterior dorsal fin is but little shorter than the second, (in the figure of Russell No. CXXXVI, *Scomber kanagurta*, Cuv. its length is $\frac{1}{3}$ of the second,) the second and third are each $2\frac{1}{2}$ in the length of the head. Although the present fish differs from Dr. Rüppell's in having 9 instead of 10 spines in the anterior dorsal fin, in other characters both agree so perfectly that they appear to be identical. A single individual was observed in August 1844, at Pinang.

GEN. THYNNUS (*Willoughby*, 1686), *Cuvier*, 1817.

Round the thorax a kind of corslet formed by scales larger, but less smooth than those of the rest of the body; a cartilaginous keel on each side of the tail between two small crests; anterior dorsal fin elongated, separated by a very short interval from the second.

THYNNUS AFFINIS, *Cantor*.

Head above and back indigo-blue, lighter, silvery, with rose-coloured reflections on the sides above the lateral line; from the angle between the points of the corslet to the tail, a number of oblique, backwards and upwards directed undulating blackish bands; sides beneath the lateral line and abdomen pale silvery or satin, with rose-coloured and light-blue reflections; cheeks and opercles shining silvery with similar reflections; anterior dorsal fin greyish buff with a dark brown line along the anterior margin of the six first spines, changing to a triangular spot in front of the succeeding ones; second dorsal, anal and their spurious fins pale brownish yellow, edged and washed with blackish; caudal yellowish buff, washed with brownish in the centre; ventrals brownish grey; pectorals silvery grey, blackish towards the margin. Iris silvery, blackish blue towards the orbit.

D 15—3/10—VIII, C $17\frac{2}{3}$, A 3/11—VII, V $1\frac{1}{5}$, P 27, Br. VII.

HABIT.—*Sea of Pinang*.

TOTAL LENGTH: 1 foot 10 inch.

In general outline this species resembles *T. pelamys* (Linné). But compared with the description and figure of the latter species, (*Cuv. and Val. T. VIII. p. 113, Pl. 214*), the present differs in colours, number of fin rays and in characters to be pointed out. The length of

the head is contained three times in the distance from the symphysis of the lower jaw to the centre of a vertical line drawn between the fifth dorsal and the anal spurious fins; it is about $3\frac{3}{4}$ in the total length. (In *T. pelamys* the head but slightly exceeds $\frac{1}{3}$ of the latter.) The height at occiput is $\frac{2}{3}$ of the length of the head.

The vertical diameter of the eye is $\frac{1}{6}$, the horizontal $\frac{1}{7}$ of the distance from the point of the upper jaw to the gill-opening. (In *pelamys* the diameter of the eye is $5\frac{1}{2}$ in the distance given.) In the upper jaw appear 23 distant, small, inwards arched teeth; in the lower 30, the posterior of which are a little stronger than the rest. The posterior part of the external margin of the palatal bones carries a single series of very minute teeth. The tongue is free, flattened, oval, and as well as the whole cavity, of a pale blackish blue colour. The vertical diameter in front of the pectoral fins is $4\frac{1}{4}$ in the total length. The anterior dorsal spine is placed opposite the second seventh of the pectoral fin. Its length is $\frac{1}{2}$ of the head, taken from the symphysis of the lower jaw. (In *pelamys* it is shorter.) The second spine is nearly as long, but only half the breadth of the preceding; the rest gradually decrease in length to the sixth, which is about $\frac{1}{3}$ longer than the seventh; the succeeding decrease less perceptibly towards the fifteenth, the length of which is about $\frac{1}{2}$ of the seventh. The distance between the anterior and second dorsal fin equals the length of the seventh spine. The anterior spine of the second dorsal fin is very short; the third scarcely exceeds $\frac{1}{2}$ of the first ray: all three spines are so completely hid by the integuments, as to be nearly imperceptible unless the latter be removed, and such is also the case with the spines of the anal fin. A vertical line drawn between the points of the caudal fin is contained a little more than $3\frac{1}{2}$ (in *pelamys* scarcely more than 3) times in the total length. The length of the pectoral fin is $6\frac{1}{2}$ in the total length. The ventrals are $\frac{2}{3}$ of the length of the pectorals, and each is received into a furrow, externally bounded by a fold of the corslet. Between the fins appears an elongated lamina, in length equalling the fifth ray, the anterior half of which is connected by a membrane to the abdomen. The corslet consists of three points: the superior extends to and clasps the second dorsal fin. The series of scales nearest the anterior dorsal fin, particularly those of the anterior part, are very large, nearly rhombic; the next three series are smaller,

yet conspicuously larger than the rest. The central point, the largest, commences opposite the seventh dorsal spine, and terminates in a blunt point opposite the fourteenth spine, while the lower, somewhat undulating margin, extends to a little in front of the origin of the ventral fins. Between the occiput and the anterior third of the pectoral fin, appears an oblique triangular space, covered with narrow elongated scales, but bounded behind by 4 or 5 oblique series of large rectangular scales. The lateral line commences gently ascending towards the sixth dorsal spine, from whence it gently descends till opposite the anterior dorsal spurious fin, when it proceeds straight to the cartilaginous keel of the tail. The third point of the corslet terminates on the abdomen, opposite the point of the pectoral fins. A single individual occurred at Pinang in December 1844.

GEN. CYBIUM, *Cuvier*, 1829.

Body elongated, without corslet; maxillary teeth large, compressed, trenchant, (lancet-shaped;) palatal bones, anterior part of vomer, tongue and branchial arches with velvety teeth.

CYBIUM COMMERSIONI, (*Lacépède*.)

Scomber commerson, *Lacép.* II. 600, Tab. 20, Fig. 1.

Scomber maculosus, *Shaw*: *Nat. Misc.* No. 982.

Russell, CXXXV. *Konam*.

Scomber commersonii, *Shaw*: *Gen. Zool.* IV., 589, Pl. 85.

Scomber maculosus, *Ibid.* p. 592.

Cybiium commersonii, (*Cuv.*) *Rüppell*: *Atlas, Fische*, Pg. 94, Taf. 25, Fig. 1.

Cybiium commersonii, *Cuv. R. A.* II. 200.

Cybiium commersonii, *Cuv. and Val.* VIII. 165.

Cybiium commersonii, *Rüppel*: *Neue Wirbelth, Fische*, p. 41.

Cybiium commersonii? *Richardson*: *Report*, 1845, 268.

Ikan Tanggiri of the Malays.

Head above and back intense blue with golden green reflections, lighter on the sides of the head and body to a little beneath the lateral line; the rest of the sides, the abdomen, opercles and cheeks shining silvery with lilac reflections; membrane of anterior dorsal fin pale lilac grey, minutely dotted with brown, upper margin black; second dorsal, anal and their spurious fins pale silvery lilac grey; anal and its spurious fins with white margins; caudal silvery blackish; ventrals

